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GROUNDWATER RESOURCES OF THE GETTYSBURG AND HAMMER CREEK FORMATIONS, SOUTHEASTERN PENNSYLVANIA

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by Charles R. Wood
U. S. Geological Survey

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ABSTRACT

The area of investigation lies in parts of Adams, York, Cumberland, Dauphin, Lancaster, Lebanon, Berks, and Chester Counties and comprises 767 square miles. It lies entirely within the Triassic Lowland section of the Piedmont physiographic province and is underlain by the sandstone, shale, and conglomerate of the Gettysburg and Hammer Creek Formations and by diabase dikes and sills.

In 1976, about 6 million gallons per day of water was obtained from wells and springs for all uses except domestic and stock use. About 90 percent of all water used was groundwater.

Average annual recharge is about 6 inches or 200 gallons per minute per square mile. Possibly as much as 144 million gallons per day of groundwater could be pumped from the entire area. However, pumping this much water would have a considerable impact on streamflow.

Most groundwater occurs in and moves through very narrow secondary openings, along bedding planes, joints, and faults. These openings tend to be well developed only in a few thin beds. The groundwater system consists of a series of alternating tabular aquifers and aquicludes, which dip northwestward 20 to 40 degrees. Nearly all deep wells drilled into this series of tabular aquifers tap water from more than one aquifer and thus are multiaquifer wells. Although compressive loading tends to close the water-bearing openings as depth increases, the thin beds probably yield significant amounts of water to wells to a depth of at least 1,000 feet.

Wells obtain most of their water by dewatering large volumes of rock in the vicinity of the pumped well. Specific yields from the zone of freshwater circulation are low, probably not much more than 1 percent in the shale and only a little more in the sandstone. During droughts, yields of heavily pumped wells are commonly one half to one third of the yields obtained during normal periods. Pumping-test data show that maximum drawdown occurs along strike from the pumped wells. Therefore, well fields in which wells are aligned perpendicular to the strike would have a minimum of interference.

Median yields of nondomestic wells are 110, 85, and 6 gallons per minute in the Hammer Creek Formation, Gettysburg Formation, and diabase,

respectively. Median specific capacities of nondomestic wells are 1.2, 1.0, and 0.07 gallons per minute per foot of drawdown for the same units.

Lithology (probably because it controls the intensity of fracturing) seems to be the most important factor affecting well yields. For the Hammer Creek Formation, the median yields of nondomestic wells in shale, in quartz conglomerate, and in sandstone, respectively, were 144, 120, and 90 gallons per minute. For the Gettysburg Formation, the median yields of nondomestic wells in the shale of the Middletown area, in shale excluding the Middletown area, in limestone conglomerate, in sandstone, and in quartz conglomerate, respectively, were 185, 74, 85, 50, and 21 gallons per minute.

Wells in diabase rarely yield more than enough for a domestic supply and about 10 percent fail to yield even that. Fractures in the diabase close very rapidly with depth and do not yield significant amounts of water below 150 feet. However, where the diabase is not too thick, it is possible to obtain moderate- to high-yielding wells by drilling through the diabase into the underlying sedimentary rocks.

Specific capacities are greater for domestic wells in valleys than for wells on hillsides and hilltops. However, the deeper nondomestic wells show little uniform relationship between specific capacity and topographic position, suggesting that yielding zones are not more abundant or permeable beneath valleys than beneath other topographic settings. Well yield and specific capacity decrease as dip of the strata increases. Also, fracture traces, faults, and thick overburden seem to have only a slight influence on the specific capacity and yield of wells. Neither the proximity to the poorly permeable diabase nor the alteration (baking) of the shale and sandstone to hornfels and quartzite near the thicker diabase sills has had much effect on well yields.

Groundwater is chiefly of the calcium bicarbonate type, and its chemical quality is good except where locally contaminated. The water contains low to moderate amounts of dissolved mineral matter and, with the exception of some water that may require treatment for hardness, is generally satisfactory for most purposes. Hardness ranges from 1 to 33 grains per gallon, or from soft to very hard. The pH is low in water from the sandstone and conglomerate, and water from these rocks is likely to dissolve copper plumbing.

Except for zinc, trace-element concentrations are generally very low. The range in zinc concentrations is 10 to 3,300 micrograms per liter and seems to be typical of groundwater in other areas of Pennsylvania. Iron exceeds 300 micrograms per liter in water from 9 of 66 wells and springs in the Gettysburg and Hammer Creek Formations and from 3 of 25 wells and springs in the diabase. Manganese exceeds 50 micrograms per liter in water from 5 of 58 wells and springs in the Gettysburg and Hammer Creek Formations and from 4 of 22 wells in the diabase.

High chloride concentrations were measured near some salt piles. Calcium, potassium, and sulfate concentrations in several of the wells at Harrisburg International Airport increased sharply during the late 1950's. Part or even most of the increase may have been caused by leaching of relatively soluble constituents from blast-furnace slag that was used as fill when the runway was extended during 1958-61. Occasional high sulfate concentrations occur naturally in the groundwater. A number of widely scattered wells have been polluted by petroleum products.

INTRODUCTION

This study is part of a continuing program to investigate the groundwater resources of Pennsylvania. The investigations are made by the U. S. Geological Survey in cooperation with the Pennsylvania Geological Survey.

Groundwater is the principal source of water for nearly all the towns and industries in the study area. Urban expansion and suburban development has increased the demand for water. An evaluation of the availability, occurrence, movement, and quality of water in these rocks is necessary for the efficient development of the resource.

Records of more than 970 wells, including almost all the public-supply and industrial wells, were compiled during this investigation.

LOCATION AND PHYSIOGRAPHIC SETTING

The area of investigation lies in parts of Adams, York, Cumberland, Dauphin, Lancaster, Lebanon, Berks, and Chester Counties and comprises 767 square miles. It is bounded on the south by Maryland, on the east by the Schuylkill River, and elsewhere by physiographic boundaries (Figure 1). It lies entirely within the Triassic Lowland section of the Piedmont physiographic province.

A large part of the study area is drained by the Susquehanna River. The extreme southwestern part is drained by tributaries of the Potomac River and the extreme eastern part by the Schuylkill River (Plate 1).

ACKNOWLEDGEMENTS

The author is grateful to the many industrial concerns, private water companies, municipal water authorities, and private well owners who supplied information and allowed their wells to be pumped and sampled.

Many well drillers provided groundwater data. The owners and employees of Kohl Bros., Inc., of Myerstown, Pennsylvania, and Harrisburg's Kohl Bros., of Harrisburg, Pennsylvania, deserve special mention for having spent much time assisting the author.

Eugene D. Hess, formerly with the Pennsylvania Geological Survey, assisted the author in selecting wells that penetrated the diabase sheets.

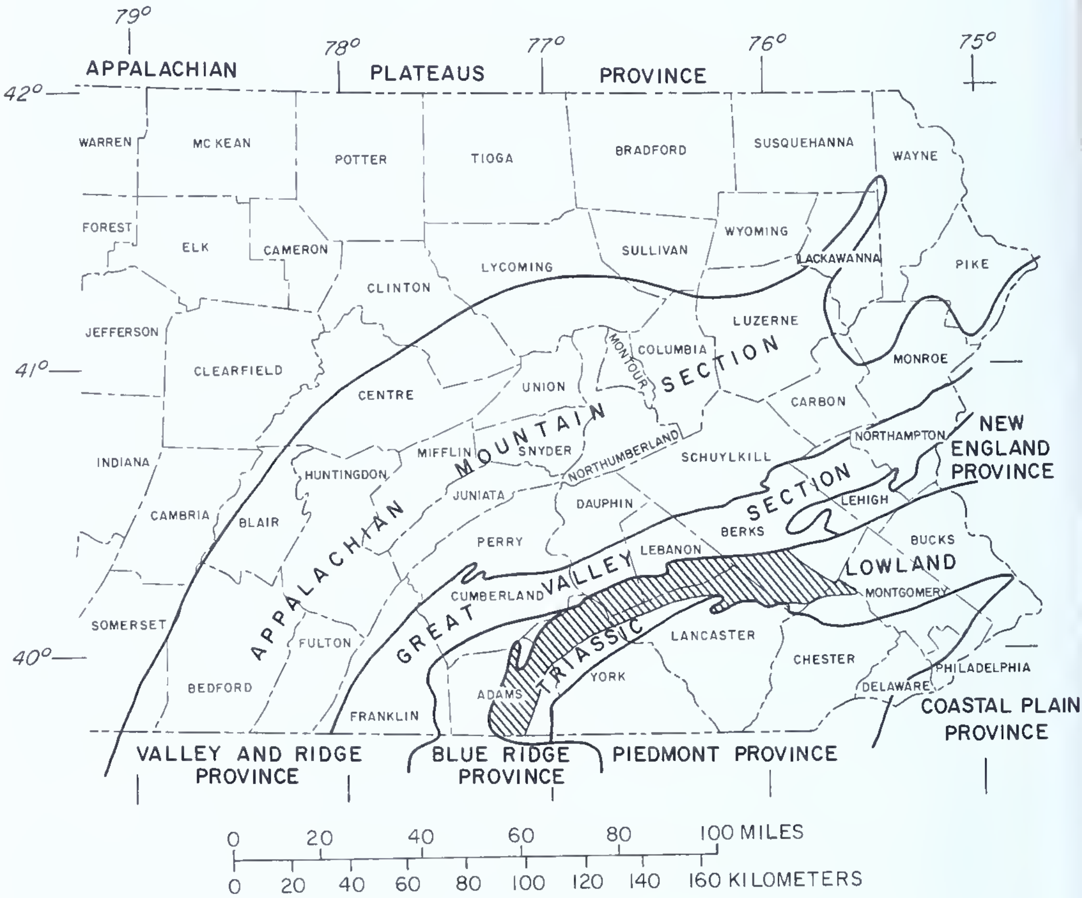

Figure 1. Map of eastern Pennsylvania showing the physiographic provinces and the location of the study area.

USE OF WATER

In 1976, 2,300 Mgal (million gallons) of water was obtained from wells and springs. This includes all withdrawals except those from privately owned domestic and stock wells (Table 1). An additional 243 Mgal was obtained from streams for public-supply use. Use of groundwater for irrigation is negligible. Thus, when individual domestic and stock users are included, about 90 percent of the total water used was groundwater.

An inventory of municipal and institutional water facilities is given in Table 2. Harrisburg International Airport, Middletown Municipal Water Authority, and Gettysburg Municipal Authority are the three largest users; and the Gettysburg, Middletown, and Reamstown areas have had the largest increases in use during the past decade.

Table 1. *Annual Groundwater Use From the Gettysburg and Hammer Creek Formations in 1976*[1]

(Quantities in millions of gallons)

County	Public and institutional supplies	Commercial, industrial, and air conditioning	Total
Adams	358	121	479
Berks	46	90	136
Chester	295	28	323
Dauphin	834	52	886
Lancaster	214	15	229
Lebanon	82	26	108
York	83	31	114
Total	1,912	363	2,275

[1] Excludes usage from domestic and stock wells and springs.

SUPPLY OF WATER

The Schuylkill and Susquehanna Rivers, their tributaries, the tributaries to the Potomac River, and the groundwater reservoirs make up a complex hydrologic system that, when adequately developed, can provide virtually all anticipated needs of the communities underlain by the Gettysburg and Hammer Creek Formations. The availability of both surface water and groundwater is governed in part by the amount and distribution of precipitation and in part by the geology, which also has a dominant effect on the quality of the water that may be obtained in a given locality.

PRECIPITATION

Precipitation is the source of all fresh water in the study area. The average annual precipitation (1931-76) ranges from 38.83 inches at York Haven to 42.97 inches at Ephrata and the mean is 41 inches (U. S. Department of Commerce, Environmental Data Service). Although precipitation is usually distributed about evenly throughout the year, the average summer rainfall is slightly higher than for any other season. Much of the summer rain comes as intense thundershowers of short duration. About one tenth of the total precipitation is snow.

STREAMFLOW

Annual stream discharge averages 15.5 inches. Only one of the streams gaged in Pennsylvania is underlain chiefly by the rocks described in this report. This is West Conewago Creek, which is gaged near Manchester. For

Table 2. *Inventory of Municipal and Institutional Water Facilities*

County	Name	Other areas served	Number of customers, 1976	Total water pumped from Gettysburg and Hammer Creek Formations, 1976 (Mgal)	Source and remarks
Adams	Arendtsville Borough		288	32	2 wells (Ad–153, 154)
	Aspers Water Co.		80	1[a]	3 wells and 10 springs (only Ad–159 in area) (used a total of 8 Mgal in 1976)
	Biglerville Water Co.	Butler Twp.	427	51	3 wells (Ad–164, 165, 166)
	Bonneauville Borough Municipal Authority		—	20[a]	1 well (Ad–268)
	Charnita Water and Improvement Assoc.	Liberty Twp.	—	10[a]	1 well (Ad–265)
	East Berlin Borough		—	10[a]	3 wells (only Ad–137 in area) (used a total of 23 Mgal in 1976)
	Fairfield Municipal Authority	Hamiltonban Twp.	300[a]	1	Springs (not in area) and 1 well (Ad–346)
	Gettysburg Municipal Authority	Cumberland Twp. and Straban Twp.	2,535	127	Marsh Creek (238 Mgal in 1976) and 2 wells (Ad–174, 252)
	Lake Heritage Utilities, Inc.	Mount Joy Twp.	208	22	2 wells (Ad–261, 262)
	Lake Meade Utilities, Inc.	Reading Twp.	200	17	2 wells (Ad–263, 264)
	York Springs Borough		180	20[a]	3 wells (Ad–155, 156, 157) and 1 spring

Berks	Birdsboro Municipal Authority	Robeson Twp., Exeter Twp., and Union Twp.	1,217	0	Hay Creek, Indian Run, Stinsons Run, and John T. Dyer Quarry (used 214 Mgal from these sources in 1976)
	Flying Hills Water Co.	Cumru Twp.	274	22	1 well (Be-316)
	Geigertown Water Co.	Robeson Twp. and Union Twp.	90	9[a]	1 spring
Chester	Citizens Utilities Home Water Co.	Spring City Bor., East Vincent Twp., and part of Montgomery Co.	3,158	166	Schuylkill River and 3 wells (only Ch-2149 in area) (used 490 Mgal from all sources in 1976)
	Pennhurst State School	East Vincent Twp.	—	122	3 wells (Ch-144, 147, 181) and Citizens Utilities Home Water Co. (standby)
Dauphin	B. & J. Water Co.	Derry Twp.	123	9	Quarry and 1 well (Da-489) as standby source
	Dauphin Consolidated Water Co.	Highspire Bor., Lower Swatara Twp., and other municipalities outside of the study area	917[b]	68	Several streams and 4 wells (only Da-403 and 404 in area) (used 2,524 Mgal from all sources in 1976)
	Harrisburg International Airport	Lower Swatara Twp.	—	468	11 wells (Da-80, 81, 82, 83, 84, 85, 88, 90, 91, 92, 93)
	Middletown Municipal Water Authority		2,511	284	3 wells (Da-99, 386, 455) and Swatara Creek (standby) (used 289 Mgal from all sources in 1976)

Table 2. *(Continued)*

County	Name	Other areas served	Number of customers, 1976	Total water pumped from Gettysburg and Hammer Creek Formations, 1976 (Mgal)	Source and remarks
Lancaster	Adamstown Water Authority		373	29	2 wells (Be-1285, 1286)
	Denver Borough		716	57	21 springs and 1 well (Ln-1305)
	East Cocalico Twp. Authority		900	70[a]	5 wells (Ln-1300, 1307, 1308, 1310, 1366)
	Ephrata Borough		3,460	20	Cocalico Creek and gravity flow from 3 wells (Ln-1393, 1394, 1395) and springs (used 326 Mgal from all sources in 1976)
	Terre Hill Borough		404	20	4 wells (Ln-1297, 1298, 1302, 1303)
	West Cocalico Twp. Authority		260[a]	18[a]	1 well (Ln-1306)
Lebanon	Campbelltown Water Co.		333	21	Springs and 2 wells (Lb-798, 799)
	Conewago Hills, Inc.	Mount Gretna Bor.	11[a]	1[a]	1 well (Lb-800)
	Cornwall Borough		578	—	Saddlers Run, White Quarry, springs, and 1 well (Lb-432) as standby source (used 90 Mgal from all sources in 1976)

	Heidelberg Water Co.	Heidelberg Twp.	425	—	4 wells (only Lb-412 and 788 in area) and 7 springs as standby source
	Mount Gretna Camp Meeting Assoc.	West Cornwall Twp.	236	7	2 wells (Lb-433, 794)
	Mount Gretna Heights Water Co.	West Cornwall Twp.	90[a]	1[a]	2 wells (Lb-434, 793)
	Pennsylvania Chautauqua	Mount Gretna Bor.	198	18	3 wells (Lb-795, 796, 797)
	Timber Service Co.	Mount Gretna Bor.	16	1[a]	1 well (Lb-826)
York	Dillsburg Borough	Carroll Twp. and Franklin Twp.	827	0	3 wells and 7 springs, none in area (used 75 Mgal in 1976)
	Newberry Water Co.	Newberry Twp.	314	27	4 wells (Yo-822, 823, 824, 825)
	Red Land Water Co.	Fairview Twp.	299	53	2 wells (Yo-826, 827)

[a] Estimated.

[b] Only the number of customers for Highspire Borough is given. Some of the customers in Lower Swatara Township also live within the study area. Some of the water used is from surface sources.

the 1929 through 1977 water years, this creek had an average flow of 582 ft^3/s (cubic feet per second), a maximum discharge of 96,200 ft^3/s (on September 26, 1975) and a minimum discharge of 1.9 ft^3/s (on October 13, 1941). Commonly, low flows for West Conewago Creek in the late summer and fall are less than 0.03 $(ft^3/s)/mi^2$ (cubic feet per second per square mile). Many small streams underlain by the Gettysburg Formation and diabase are dry during extended drought. Base flows are much higher for streams draining the Hammer Creek Formation. More detailed information on streamflow can be obtained from *Water Resources Data for Pennsylvania,* volumes 1 and 2, issued annually by the U. S. Geological Survey.

WATER BUDGET

The phases of the hydrologic cycle can be expressed quantitatively in the form of a water budget. In simplified terms, a water budget states that for a given area and interval of time the inflow of water is equal to the outflow plus or minus the change in storage. As a large part of West Conewago Creek basin is underlain by the Gettysburg Formation and diabase, a budget study was done for this basin.

The average monthly water budget during 1931-76 is given in Table 3. The monthly values of evaporation and transpiration used in the table were increased slightly from those calculated for the nearby Swatara Creek basin, by Stuart and others (1967), to account for a difference of 2 inches per year in evaporation and transpiration between the Swatara and West Conewago Creek basins. Changes in soil moisture could not be separated from changes in groundwater storage using available data. The sum of these two terms was calculated by subtracting runoff plus evaporation and transpiration from precipitation.

The water budget in Table 3 shows that the period of the greatest evaporation and transpiration—May through August—coincides with the period of greatest withdrawal of groundwater and soil moisture from storage. Runoff decreases during this period, as much of the rainfall is stored as soil moisture. An analysis of water-level data from well Ad–146 suggests that the maximum increase in groundwater storage occurs in September, although soil-moisture storage continues to decrease. Most groundwater recharge takes place before the end of November. The period of the greatest increase in soil-moisture storage is from October through January. The combined soil-moisture and groundwater storage decreases by 6 inches between April and September. Most (probably about 80 percent) of this decrease is from soil-moisture storage.

The percentage of annual discharge that is base runoff (groundwater discharge) was determined for West Conewago Creek at Manchester for 1966, a dryer than normal year, and for 1972, a wetter than normal year. The percentage was 38 in 1966 and 39 in 1972. As recharge equals discharge under

Table 3. *Average Monthly Water Budget for the West Conewago Creek Basin, 1931-76*

(Quantities are in inches)

Month	Precipitation[1]	=	Runoff	+	Evaporation and transpiration	+	Change in groundwater storage and soil moisture
January	2.88	=	1.70	+	0.10	+	1.08
February	2.62	=	1.99	+	.23	+	.40
March	3.63	=	2.74	+	.62	+	.27
April	3.52	=	2.09	+	1.80	−	.37
May	3.86	=	1.42	+	3.48	−	1.04
June	3.87	=	.79	+	4.20	−	1.12
July	3.70	=	.61	+	5.13	−	2.04
August	3.69	=	.57	+	4.48	−	1.36
September	3.61	+	.65	+	3.08	−	.12
October	3.20	+	.60	+	1.60	+	1.00
November	3.23	+	.96	+	.51	+	1.76
December	3.16	=	1.42	+	.20	+	1.54
Annual	40.97	=	15.54	+	25.43	+	0.0

[1] Average of data from Arendtsville (1931-71)/Biglerville (1972-76), Gettysburg, York Haven, Hanover, and Spring Grove stations.

natural conditions and 38.5 percent of the 15.54 inches, or 6 inches, of average annual runoff is baseflow, about 6 inches of water is being recharged to the aquifers of the study area in an average year. This is equal to 200 gpm (gallons per minute) for each square mile and is probably similar to the long-term sustained yield that can be obtained from wells that are not in areas underlain by diabase or in a few other areas of known low yield. As about 500 square miles of the 767 square miles is underlain by moderately permeable rocks, the maximum amount of water that can be pumped from the aquifers is 144 Mgal/d (million gallons per day).

An average recharge of 6 inches per year is unusually low for Pennsylvania, and suggests that groundwater storage in the Triassic rocks is lower than for most of the other rocks in the state.

GEOLOGY

STRATIGRAPHY

The lithologic types, thicknesses, and nomenclature of Triassic sedimentary rocks in Pennsylvania are summarized in Table 4. All units are subdivisions of the Newark Group.

Gettysburg Formation

The Gettysburg Formation consists of red shale; red, brown, and gray sandstone; and coarse quartz conglomerate and limestone conglomerate, all of which are interbedded to some extent. West of the Susquehanna River, the shale is commonly micaceous. In the vicinity of Gettysburg, Adams County, the thickness of the Gettysburg Formation was estimated by Stose and Bascom (1929) to be 15,500 feet.

In Adams County a thick fanglomerate lies at the top of the formation. It crops out for 20 miles along the foot of South Mountain in northern Adams County and extends into York County about a mile. It consists of a coarse conglomerate of rounded cobbles and boulders of quartzite, sandstone, quartz, and some aporhyolite in a matrix of red sand. The conglomerate generally forms high hills at the foot of the mountains.

In Adams County, near Fairfield, limestone conglomerate crops out at the top of the formation. The pebbles of the conglomerate are largely composed of gray to pink marble, gray dolomite, and gray impure laminated limestone, and the matrix is a red to gray, calcareous clay or fine sand. In York County, beds of limestone conglomerate crop out at a few scattered areas along the northwestern edge of the Gettysburg Formation. These local conglomerate masses are poorly sorted and have an abundant shaly matrix, and the clasts generally reflect the lithology of immediately adjacent ex-

Table 4. *Summary of Stratigraphic Information*

Dauphin-Lebanon County line to Maryland border	Schuylkill River to Dauphin-Lebanon County line (modified from Glaeser, 1966)	Schuylkill River to western New Jersey
GETTYSBURG FORMATION 15,500 feet thick	HAMMER CREEK FORMATION 9,400 to 12,200 feet thick	BRUNSWICK FORMATION 9,000 to 16,000 feet thick
Red, medium- to fine-grained sandstone and shale. Conglomerate in upper part. Sandstone is more abundant in the eastern part of the area. Heidlersburg (middle) Member is red, green, and gray shale and argillite and minor gray to white sandstone.	Conglomerate, coarse sandstone, and minor shale.	Red shale, siltstone, and sandstone. Conglomerate and coarse sandstone in upper part. Some gray shale and argillite near base.
		LOCKATONG FORMATION 1,500 to 4,000 feet thick
		Upper part—alternating red and gray argillite and shale. Lower part—dark-gray shale and argillite; siltstone and sandstone near base. Lenses out west of Schuylkill River.
NEW OXFORD FORMATION 4,800 to 6,900 feet thick	NEW OXFORD FORMATION (in western part) 500 to 4,800 feet thick STOCKTON FORMATION (in eastern part) 2,300 to 6,000 feet thick	STOCKTON FORMATION 2,300 to 6,000 feet thick
Arkose, conglomerate, and red sandstone, siltstone, and shale. Unconformable upon lower Paleozoic and Precambrian rocks.		Arkose, conglomerate, and red sandstone, siltstone, and shale. Unconformable upon lower Paleozoic and Precambrian rocks. Top gradational with overlying Lockatong Formation.

posures of pre-Triassic rocks. Conglomerates of this type are marginal facies deposited by alluvial fans or mudflows, and possibly even as talus.

The Gettysburg Formation gradually changes northeastward along strike from mostly shale in Adams County to about equal amounts of shale and pebbly sandstone in northeastern York County. Shale appears to be somewhat more abundant than sandstone and conglomerate from the Susquehanna River to the Dauphin-Lebanon County line. Although no abrupt change takes place at this line, the name Hammer Creek is used from here to the Schuylkill River. The shales in the Highspire-Middletown area have somewhat arbitrarily been referred to as sandy shale in the well and chemical tables in order to make a separate hydrologic analysis of the data from this area. This shale is not very different from the shales along strike to the immediate east and west.

Hammer Creek Formation

The Hammer Creek Formation of Glaeser (1964, 1963) (herein adopted for usage by the U. S. Geological Survey) consists of red, brown, and gray sandstone, fine to coarse quartz conglomerate, and some red shale, typically nonmicaceous, and is interbedded nearly everywhere with siltstone and sandstone. The shale is so easily eroded that it is not often seen in outcrop. Red shale is the dominant rock type in the extreme eastern and western parts of the outcrop belt. Hammer Creek sandstone is composed principally of quartz grains and a small percentage of rock fragments imbedded in a matrix of clay-sized material containing hematite. The sandstones grade into siltstones having a high percentage of matrix and into conglomerates. Sandstone bedding thickness ranges from 1 to 2 inches to a foot or more. Grain sizes range from very fine to coarse.

Coarse quartz conglomerate forms some prominent ridges and nearly all of the higher hills within the outcrop area of the Hammer Creek Formation. The conglomerate is commonly well sorted and has a shale-free matrix. The coarse clasts are rounded and predominantly light-gray, fine- to medium-grained quartzite, a lithology that is not present immediately adjacent to the outcrop. In general, although conglomerate is more abundant higher in the section, conglomerate beds are present throughout the Hammer Creek Formation. These characteristics are clearly distinct from those of irregular fanglomerate masses that appear along much of the northwestern margin of the Newark Group. However, locally, limestone conglomerate is present.

For the purposes of this report, the Hammer Creek Formation will be considered to extend eastward from the Dauphin-Lebanon County line to the Schuylkill River. This is slightly different from the usage of Glaeser (1966), who placed an arbitrary cut-off line slightly west of the Schuylkill. Estimates of the thickness of the Hammer Creek by McLaughlin (written communication, 1964) range from 9,400 to 12,200 feet.

Diabase and Basalt

The sedimentary rocks of the Gettysburg and Hammer Creek Formations have been intruded by large sills and cross-cutting bodies of diabase and by many long, narrow dikes (Hotz, 1952). At least one small basalt flow crops out near Bendersville. The outcrop of diabase or basalt north of Arendtsville may also be part of this flow.

The long, narrow dikes are rarely more than 100 feet thick, and about 50 feet is typical for prominent dikes that have been traced many miles. Most of the narrow dikes are approximately vertical. These bodies may have risen along fractures associated with faults, implying that the faults existed before the diabase was emplaced.

The diabase of the major sheets is a medium- to coarse-grained, dark-gray rock composed chiefly of gray plagioclase and black or greenish-black pyroxene. The rock in outcrop is massive and weathers into large spheroidal boulders that cover wide areas. Such land is unfit for cultivation and is usually heavily wooded. A stiff clay that is relatively impervious to moisture has formed where the rock is deeply weathered, and level areas underlain by diabase are usually poorly drained (MacLachlan and others, 1975, p. 168). The sheets generally range in thickness from a few hundred feet to about 2,000 feet. Attitudes of the sheets and some thicknesses are given on Plate 1.

Metamorphic Effects

Adjacent to the diabase, the hematite in the red shale has been reduced to magnetite, and the rock has become dark-gray, black, or purplish-black hornfels. Siltstone has been altered to light- or medium-gray, siliceous hornfels. Quartzose sandstone and conglomerate are recrystallized to tough, brittle, light-gray quartzite (McLaughlin, written communication, 1964).

STRUCTURE

The structure of rocks in the Newark Group is broadly a north-northwestward-dipping homocline, modified by local folds plunging northward and reversed dips adjacent to the north border of the basin, and cut by a few faults at large angles to the strike. The highest density of mappable faults is in eastern Lebanon and western Berks Counties. Dips in most of the area are northwestward or northward, ranging commonly from 20 to 40 degrees. The outcrop pattern of the basins is broadly parallel to the Appalachian fold belt.

The northern border itself is a major fault over part of the study area, but the surface expression of the basin-border fault is not continuous, and, at some places, the Newark rocks lie unconformably upon or against the older rocks exposed at the north border. The Newark rocks may have been deposited against steep mountain slopes produced by erosion or faulting.

GROUNDWATER RESOURCES

PRINCIPLES OF FLOW

Gettysburg and Hammer Creek Formations

Most water in the Gettysburg and Hammer Creek Formations occurs in and moves through narrow secondary openings, such as bedding planes, joints, and faults. These openings provide an interconnected series of channels through which water can flow. Compression tends to close the openings. Therefore, they are generally best developed near the surface and occur less frequently and are not as large deeper in the formations.

The spaces between grains in sandstone and conglomerate contribute only a slight amount of water. At the Morgantown mine, Biemesderfer and Leske (1961, p. 40) observed that in the Stockton Formation, which is similar at this site to the Hammer Creek Formation, ''primary porosity in the conglomerates provided part of the flows, but fracture porosity yielded the major quantities.''

The number and width of openings and, consequently, the permeability differ from one bed to another. In a series of beds 100 feet thick there may be only one or two beds in which the openings are well enough developed to permit the bed to transmit significant amounts of water. These beds range in thickness from a few inches to a few feet. The intervening unfractured rock has almost no capacity to store and transmit water.

The degree to which fractures have developed depends on the composition and texture of the rocks and also on the direction and intensity of the forces that have acted upon the rocks. Examination of outcrops shows that where there are thin hard beds of sandstone between beds of soft shale, the shale tends to deform under stress without breaking, whereas the hard sandstone tends to develop fractures and joints. The thicker a hard, competent bed is, the less tendency it has to develop joints (see Figure 2). Therefore, very thick bedded sandstones and conglomerate generally have only a few widely spaced joints, and well yields from these rocks are generally lower than those from thin-bedded sandstone.

As some beds contain more openings than others, the groundwater system consists of a series of alternating tabular aquifers that dip 20 to 40 degrees to the northwest. The network of water-bearing fractures in each tabular aquifer is more or less continuous along strike, but continuity of individual beds is limited by faulting, intrusion of diabase dikes, and pinching out. The beds are overlapping, lens-shaped, and discontinuous in all directions, but may extend for several thousand feet. These tabular aquifers generally extend downdip from a few hundred feet to as much as 3,000 feet below land surface. They generally intersect the surface within several hundred feet of the well.

Figure 2. Joints in the Hammer Creek Formation 0.4 mile southwest of Beckersville, Pennsylvania. Note that joints are well developed in the more resistant sandstone and siltstone, but poorly developed in the interbedded shale. Joints are, in general, more numerous in the thinner beds. The uppermost bed in the top left corner of the photograph is 4 feet thick.

Hydraulic connection between individual aquifers is poor. For example, a well tested by pumping for 72 hours had the bowl assembly ''frozen'' in the hole by caving sand. The sand acted as a packer, and only 1.17 feet of drawdown was observed above the bowl assembly, whereas 142 feet of drawdown was observed below it. Some of the drawdown in the upper part of the well was caused by downward flow from the upper yielding zones to the lower ones in an observation well (Lb-724) 300 feet away. Thus, the ratio of horizontal to vertical permeability was well in excess of 100 to 1 near well Lb-713.

Nearly all wells deeper than 200 feet tap water from more than one aquifer and thus are multiaquifer wells. Where there are differences in hydraulic head between water-bearing openings, internal flow occurs in wells under nonpumping conditions from the zone of higher head to that of lower head. The movement of injected brine slugs was observed in 16 wells in order to determine the direction of these internal flows. Of these 16 wells, five had no internal flow, one had upward flow, seven had downward flow, and

three had upward flow in part of the borehole and downward flow in another part of the borehole. The hilltop wells tend to have downward flow. However, four of the seven downward-flowing wells were in valleys. This suggests considerable lateral flow to points of discharge downstream from the wells.

The greatest permeability in the Gettysburg and Hammer Creek Formations, and thus the greatest movement of water in response to pumping, is parallel to the strike of bedding. Pumping-test data show that the maximum drawdown occurs along strike from the pumped well. Observation wells only a few hundred feet from the pumped well in a direction perpendicular to the strike commonly show little or no drawdown. Therefore, well fields designed so that wells are aligned perpendicular to the strike of the beds would minimize interference.

Well Be–1277 was pumped at 500 gpm, and the drawdown of the water level was observed in the pumped well and three observation wells along strike to the west of the pumped well. The following table shows the drawdown observed in each of these wells after 24 hours of pumping:

Well no.	*Distance from pumped well (feet)*	*Depth of well (feet)*	*Drawdown after 24 hours (feet)*
Be–1277	0	400	109.0
1278	304	325	21.9
1279	1376	215	1.5
1280	2220	110	.8

None of the observation wells are as deep as the pumped well, and none penetrate all the water-yielding zones that the pumped well does. Thus, drawdowns are not the same as they would be for wells equal in depth to the pumped well. However, the drawdowns give the approximate relationship between drawdown and distance from the pumped well.

On the basis of flow-meter tests in the Brunswick Formation, Rima (1955, p. 9-10) stated that,

> . . . the aquifers that underlie the Lansdale area may be divided into two classes. A water table aquifer that exhibits low permeability through a considerable thickness occurs to a maximum depth of about 250 feet; below it are one or more artesian or semiartesian aquifers each generally less than 20 feet thick, which have a relatively high permeability, and occur to a maximum depth of about 600 feet.

A shallow water-table aquifer that is thinner than the one Rima (1955) described for the Brunswick Formation is present in the Gettysburg and Hammer Creek Formations. The artesian aquifers are recharged by the overlying water-table aquifer. It is probably only a few feet to a few tens of feet thick and grades gradually into the artesian (confined) aquifers. Specific yields from the zone of freshwater circulation are low, probably

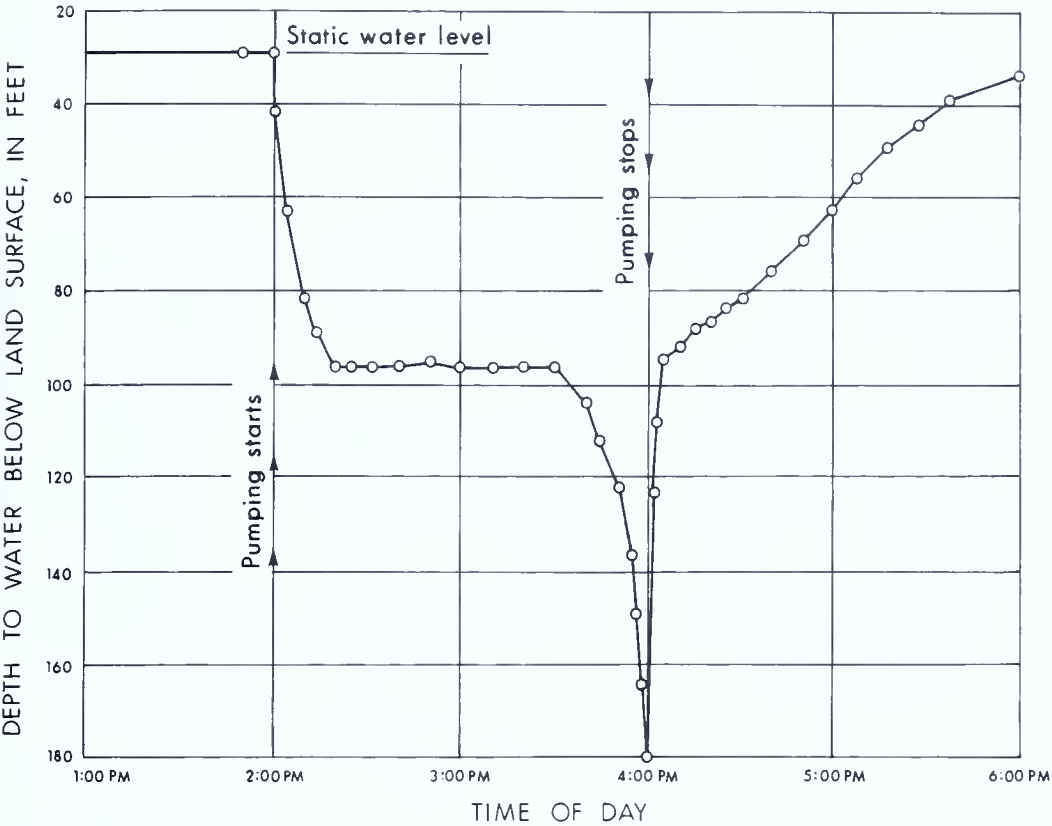

Figure 3. Water levels in a well in diabase that is discharging at a constant rate (from Biesecker and others, 1968, p. 150).

not much more than 1 percent for the shale and only a little more for the sandstone. Because available groundwater storage is not great, the input to storage from precipitation must annually approximate the withdrawal from wells if depletion is to be avoided.

Diabase

The diabase weathers to a maximum depth of about 30 feet, and almost all groundwater storage occurs in this zone. Water moves through joints and other fractures. The size of the openings decreases rapidly with depth, and fractures capable of transmitting water are rarely found below 150 feet.

Yields of wells in the diabase tend to decline sharply in the first hours of pumping. A typical hydrograph of a pumped well in the diabase is shown in Figure 3. Note that after the first 20 minutes of pumping the water level remained constant for 70 minutes and then declined sharply. This represents the effect of draining the water out of a fracture that is sealed off at the surface by a layer of clay. The recovery curve is different than the drawdown curve. During the recovery, the air that entered the fracture during the

drawdown becomes trapped in the fracture. Thus, water enters the fracture only as the air in it is compressed by the rising water level in the well or as the air slowly escapes through the clay layer.

SPRINGS

The water table is essentially a subdued replica of the land surface; precipitation infiltrates to the water table and flows downslope to points of discharge in the valleys. Only rarely does groundwater flow more than a few thousand feet before being discharged to streams. Individual springs are generally small—wet-weather flows rarely exceed 100 gpm—and most springs are dry during drought. Thus, few springs are used for water supply. Water from three springs was sampled for chemical analyses. The springs are (1) Ad–Sp–2, York Sulphur Springs (39°59′44″N/77°05′04″W), which discharges 2 gpm of water from diabase and has a hydrogen sulfide odor; (2) Be–Sp–2 (40°15′35″N/75°55′05″W), a small domestic spring issuing from a quartz conglomerate bed in the Hammer Creek Formation; and (3) Yo–Sp–14 at Pythian Park (40°06′37″N/76°43′22″W), which discharges 0.5 gpm from diabase.

WATER LEVELS

Depth to Water

Depths to water are summarized in Table 5. Only domestic wells are included as water levels in these wells are not affected by pumping in nearby wells.

Because they generally penetrate several yielding zones, deep wells commonly have composite water levels; that is, the water level observed in the well is an approximate average of the water levels in a well tapping each individual zone. In areas of low relief the head differences between individual zones are rarely more than a few feet. For hilltop wells in areas of high relief, the head differences between individual zones may be a few tens of feet. For example, the water level in well Da–530, which is on a hilltop, was 30 feet below land surface when a minor yielding zone at 54 feet had been penetrated. After the well was drilled to a depth of 815 feet and penetrated major yielding zones at 432, 624, and 716 feet, the water level was 58 feet below land surface. Thus, there was nearly a 30-foot difference between the head in the upper zone and the average head of all four zones. The depths to water in valley wells are essentially the same regardless of the lithology (Table 5). Except for wells in limestone conglomerate, depths to water for hillside and hilltop wells increase as the sedimentary rocks become coarser grained. Thus, depths to water are least for the shale and greatest for the quartz conglomerate. This is not surprising, as the coarser grained sedimen-

Table 5. *Depth to Water in Domestic Wells*

Geologic unit	Depth to water, in feet, exceeded in indicated percentage of wells								
	Valleys			Hillsides			Hilltops		
	10 percent	50 percent (median)	90 percent	10 percent	50 percent (median)	90 percent	10 percent	50 percent (median)	90 percent
Diabase	53	11	7	60	20	7	66	20	11
Gettysburg Formation	50	20	6	89	40	14	95	35	10
Quartz conglomerate	—	—	—	—	35	—	—	—	—
Limestone conglomerate	—	15	—	—	9	—	—	7	—
Sandstone	58	20	8	97	48	16	100	50	10
Shale	49	20	3	55	28	10	83	30	7
Hammer Creek Formation	34	17	8	74	35	10	148	53	31
Quartz conglomerate	28	14	2	93	48	12	220	85	18
Sandstone	34	18	4	73	33	9	180	80	34
Shale	35	18	7	70	33	9	58	48	20

tary rocks form a topography having much more relief than the areas underlain by shale. Although data are scarce, water levels in limestone conglomerate tend to be very high in all topographic settings. In the vicinity of heavily pumped wells, water levels may be much deeper than shown in Table 5.

Fluctuations

The principal changes in water levels are seasonal. Water levels generally start to decline in March or April and continue to decline until late fall. Even though precipitation is greater during the summer than during the winter, less precipitation reaches the water table during the summer and fall because large amounts of water are evaporated from the soil and transpired by vegetation. Rain and snowmelt recharge the aquifers during the winter and early spring, and water levels generally rise during this period. Natural annual fluctuations of water levels in wells generally range from 3 to 20 feet. Water levels in wells on hills and slopes generally fluctuate more than those in wells in the valleys.

Lithology also influences the magnitude of annual fluctuations. Typical hydrographs for two observation wells in the Gettysburg Formation are shown in Figure 4. The two hydrographs are similar, except the amplitude of the fluctuations is greater for Yo–842 than for Ad–146. Well Yo–842 is in an area of conglomerate that has a low permeability and specific yield, whereas Ad–146 is in an area underlain by shale that has a higher permeability and specific yield.

Because storage is small and water levels recover quickly, periods of water-level decline longer than 1 year are unlikely. There has been no long-term decline in water levels throughout the area, but cones of depression can occur within a few thousand feet of heavily pumped well fields. Because pumping draws water levels below the lowest levels encountered under static conditions, the seasonal water-level fluctuations are greatly amplified in and near pumped wells.

AVAILABILITY

The following sections discuss the principal factors that affect the availability of groundwater. Availability is measured either as well yield or specific capacity (well yield divided by drawdown).

Most shallow domestic wells, especially in the clastic rocks, do not adequately test the yield of the aquifers. For most domestic purposes, 6-inch-diameter wells are drilled, and the well is typically located for convenience and low costs. A well yield of a few gallons per minute is generally adequate, and drilling is stopped when such a yield is obtained. Little effort is expended in developing the maximum potential yield of the well. The medi-

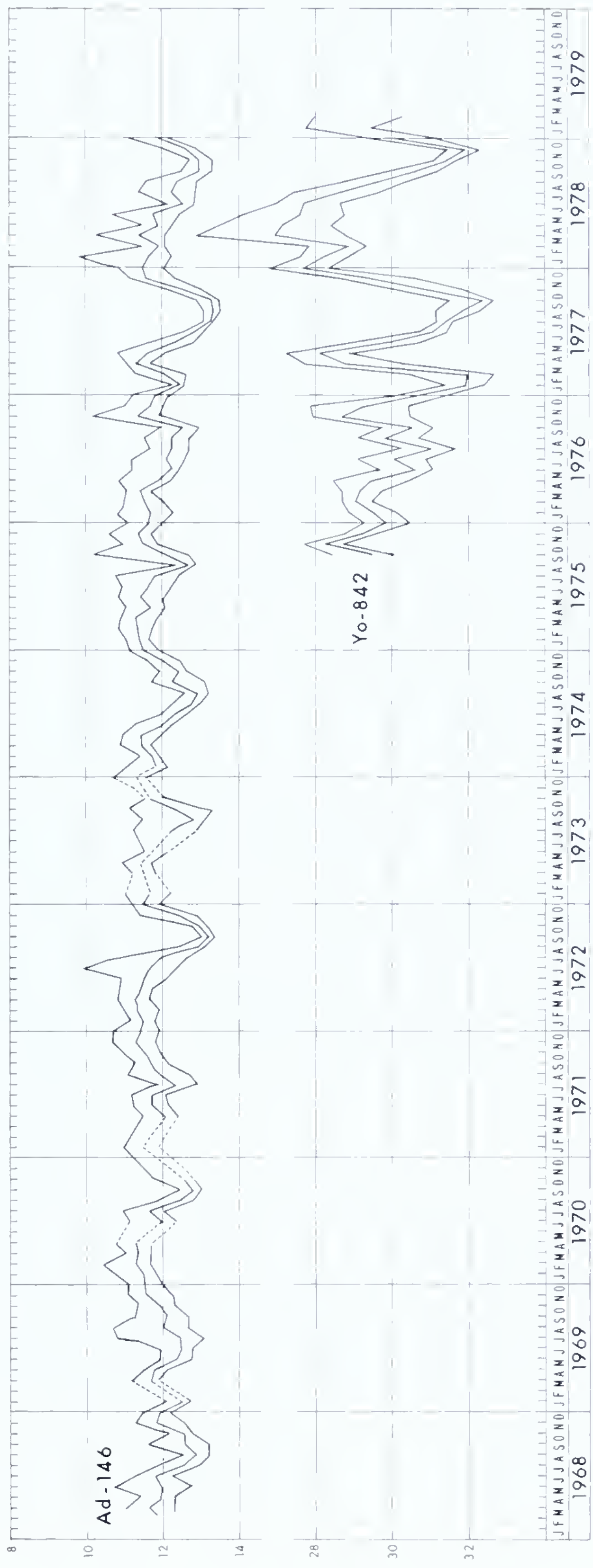

Figure 4. Hydrographs of maximum, mean, and minimum monthly water levels in wells Ad-146 and Yo-842.

an yield of domestic wells is 10 gpm in the Gettysburg Formation, 20 gpm in the Hammer Creek Formation, and 6 gpm in the diabase.

In contrast, nondomestic wells, which are commonly 8 to 12 inches in diameter and are generally much deeper than domestic wells, can have large drawdowns that account, at least in part, for the higher yields from these wells. The median yield of nondomestic wells is 85 gpm in the Gettysburg Formation, 110 gpm in the Hammer Creek Formation, and 6 gpm in the diabase.

The yields used in this report are largely based on tests of less than 72 hours duration. Caution should be used in predicting long-term yield for wells that are to be pumped continuously for industrial and public-supply use. The yield of a typical well may be relatively high when drilled, but it may decrease markedly as the aquifer around the well is dewatered. The long-term yield of a well is commonly no more than one half to one third of the test yield.

Most comparisons between aquifers in this report are based on specific capacities calculated from pumping-test results reported by drillers and consultants. A few tests, mostly on public-supply and industrial wells, were made by the U.S. Geological Survey.

Specific capacities of nondomestic wells in the Hammer Creek and Gettysburg Formations are about four times as great as those of domestic wells. This difference may be attributed to: (1) the nondomestic wells are commonly deeper and penetrate more water-bearing zones than the domestic wells; (2) a preponderance of the nondomestic wells are in valleys, where specific capacities are generally higher than in other topographic settings; (3) the nondomestic wells have slightly larger diameters; (4) many domestic wells were tested by blowing with compressed air, and because the air pressure forces some water back into the aquifers, this method produces less yield than pumping to an equal drawdown; and (5) the higher domestic yields are understated by some drillers, who do not report yields in excess of those they consider adequate for a household supply.

Topography

In most aquifers, topographic position affects the yields of wells. Those on the tops and slopes of high hills and ridges generally have low yields, and those in the valleys generally have high yields. Specific-capacity data were placed in one of three categories that best describe the position of the well. They are (1) hilltop, (2) hillside, and (3) valley. Median specific capacities for the various geologic units in each topographic position are summarized in Table 6.

Domestic wells in the Hammer Creek Formation had poorest yields on hilltops and best in valleys, as expected. Domestic wells in the Gettysburg

Table 6. *Median Specific Capacities of Wells by Topographic Position*

Geologic unit	Number of wells tested	Median specific capacity, in gpm/ft Valley	Hillside	Hilltop
	Domestic Wells			
Diabase	59	0.13	0.10	0.14
Gettysburg Formation	131	.39	.15	.18
Sandstone	89	.26	.15	.19
Shale	37	.40	.17	.18
Hammer Creek Formation	164	.71	.46	.27
Quartz conglomerate	31	.59	.53	.27
Sandstone	69	.96	.53	.28
Shale	63	.62	.42	.27
	Nondomestic Wells			
Gettysburg Formation	103	1.4	.85	.56
Sandstone	27	.16	.62	.56
Shale	34	.97	1.2	.60
Hammer Creek Formation	64	1.3	.94	1.6

Formation and diabase have better yields in valleys than on hillsides, but hilltop wells have slightly better yields than hillside wells.

Industrial and public-supply wells show little or no uniform relation between specific capacity and topographic position. Apparently, the principal reason that specific capacities of domestic wells are higher in valleys than on hills is that water levels in wells on hills and ridges generally lie farther below the land surface than those in valleys. As a result, water-bearing zones near the surface in the valleys are usually saturated with water, but at similar depths under the hills are dry. The industrial and public-supply wells are generally much deeper than the domestic wells, and much of their specific capacity is contributed by the deeper zones. Thus, the topographic effect is largely masked. The absence of a clear relation between topographic position and specific capacity for the deeper wells implies that yielding zones are not more abundant or more permeable beneath valleys than beneath other topographic settings.

Depth of Weathering

A zone of weathered rock, or overburden, underlies the land surface throughout most of the basin. This weathered zone has a higher porosity than the unweathered rock, and, where it does not contain large amounts of clay, it may have a fairly high permeability. Water-table conditions generally prevail in the weathered zone, and it is recharged directly by precipitation. The weathered zone is generally a major source of recharge to the openings in the underlying bedrock.

The thickness of the weathered zone is rarely more than 100 feet and is generally much less. Median thicknesses of overburden penetrated by domestic wells are 11 feet for the shale and sandstone of the Gettysburg Formation, 23 feet for limestone conglomerate of the Gettysburg Formation, 20 feet for the shale of the Hammer Creek Formation, 30 feet for sandstone of the Hammer Creek Formation, 14 feet for quartz conglomerate of the Hammer Creek Formation, and 12 feet for the diabase.

The length of casing necessary to keep the well open is only partly related to thickness of overburden. Median depth of casing of domestic wells in all lithologies of the Hammer Creek Formation and sandstone of the Gettysburg Formation is 42 feet. Median casing depth of domestic wells in diabase and in the shale of the Gettysburg Formation is 26 feet.

Caving of sides of wells is a problem in a few areas underlain by sandstone. About 10 percent of the wells on hillsides in the sandstone of the Gettysburg Formation require more than 100 feet of casing. One well on a hilltop south of Hershey required 471 feet of casing, and many nearby wells are reported to have similar lengths of casing. Caving is also a problem on some of the sandstone ridges near the Berks-Lancaster County line. In gen-

eral, however, the length of casing used shows relatively little relationship to topographic position. Nondomestic wells generally have a few more feet of casing than domestic wells.

Thickness of overburden also seems to have only a slight influence on the specific capacities and yields of wells. For the principal lithologies, the median specific capacities of wells having relatively little overburden—generally less than 10 feet—were compared with those of wells having a relatively large thickness of overburden—generally 25 feet or more. In every case, except for the sandstone of the Hammer Creek Formation, the median specific capacity of the group having the least overburden was slightly higher than that of the group having the most overburden. For the sandstone of the Hammer Creek Formation, wells that had less than 15 feet of overburden had a median specific capacity about twice as large as a group of wells that had 40 feet or more of overburden.

Lithology

Reported yields of nondomestic wells are summarized in Table 7 for each lithology. In general, wells in shale have the highest yields, especially those in the Middletown area. Lithology, however, probably accounts for only part of the higher than normal yield, as wells in this area have a greater median depth. Also, the presence here of overlying saturated gravel and of induced recharge from the Susquehanna River may contribute to these yields (Meisler and Longwill, 1961).

Wells in the quartz conglomerate of the Gettysburg Formation have the lowest yield for sedimentary rock. Nearly all wells in this group are in fanglomerates deposited along the northern border of the Triassic basin. Apparently these thick-bedded rocks have little intergranular permeability, nor do they have many fractures. Yields are much higher for wells in the quartz conglomerates of the Hammer Creek Formation, which are interbedded with sandstone and shale and are present from the base to the top of the formation.

The limestone conglomerate is one of the most variable aquifers, but data on this unit are scarce. Nearly half the wells yield large to very large supplies of water, but some are barely adequate for domestic use. This variability is controlled by the size of the openings in the rock, some of which have been developed by solution, and whether a well intersects them.

In general, well yields in the limestone conglomerate are low in York and Cumberland Counties, and high in other areas. The median yield of six wells in Adams County is 225 gpm. Specific-capacity data indicate that even the poorest of these six wells could yield more than 100 gpm, although their median depth is only 116 feet. Yields of five wells in York and Cumberland Counties ranged from 7 to 75 gpm and the median was 25 gpm. These five wells have a median depth of 300 feet.

Table 7. *Reported Yields of Nondomestic Wells*[1]

Geologic unit	Median depth of wells used in frequency distribution, in feet	Number of wells used in frequency distribution	Yield, in gallons per minute, exceeded by indicated percentage of wells				
			10 percent	25 percent	50 percent (median)	75 percent	90 percent
Diabase	231	16	38	25	6	1	0
Gettysburg Formation	388	141	294	184	85	30	20
Quartz conglomerate	230	13	54	32	21	10	3
Limestone conglomerate	200	11	280	230	85	25	8
Sandstone	276	30	160	83	50	23	18
Shale							
Middletown area	459	41	630	280	185	100	81
Excluding Middletown area	400	46	220	160	74	30	21
Hammer Creek Formation	300	84	300	200	110	51	25
Quartz conglomerate	290	12	290	240	120	30	12
Sandstone	250	49	300	170	90	45	22
Shale	313	22	290	170	144	100	46

[1] Includes public-supply, industrial, air conditioning, and irrigation wells.

In general, wells in the Hammer Creek Formation have higher yields than those in the Gettysburg Formation. This may be partly due to the slightly more intense structural deformation of the Hammer Creek. Lithologic differences may also account for some of the observed difference.

Specific-capacity data for domestic and nondomestic wells are given in Tables 8 and 9. In general, the lithologies that have the highest specific capacities are those having the highest reported yields. Specific capacities of nondomestic wells are generally two to five times higher than those for domestic wells, largely due to the greater depth of the nondomestic wells, which shows that substantial amounts of water are encountered at depths greater than those penetrated by most domestic wells.

The diabase is the poorest aquifer. At least 10 percent of the wells in diabase fail to yield enough water for even a barely adequate domestic supply. Wells yielding more than 30 gpm are rare. Because it is such a poor aquifer, diabase dikes and sills tend to act as barriers to the movement of water through the Gettysburg and Hammer Creek Formations.

Specific capacities were determined on 42 wells near diabase dikes and sills. Four wells penetrated less than 100 feet of sediment before being completed in a thick diabase sill. All failed to yield enough water for an adequate domestic supply. The yields of the other 38 wells are nearly identical to those that are not near diabase. Apparently neither the proximity to the low-permeability diabase nor the alteration (baking) of the shale and sandstone to hornfels and quartzite near the thicker diabase intrusives has affected the well yields. However, a few wells have a high-yielding zone at the contact between the base of a sill and the underlying sedimentary rocks; for example, well Yo–947 yields 150 gpm from such a zone at a depth of 417 feet below land surface.

Differences in lithology probably account for the low yields found in several areas. Deep wells in and near Bonneauville generally yield 5 to 40 gpm. Apparently these wells are in lithologies transitional to the underlying and low-yielding New Oxford Formation. The deeper wells are probably partly in the New Oxford. Wells in sandstone within 0.4 mile of the northern border of the Triassic basin from New Cumberland to Highspire and north of the Pennsylvania Turnpike from Highspire to Swatara Creek generally have lower than average yields. Also, wells in an area about 2 miles wide along the northern border of the basin from the Adams-York County line to the vicinity of Lisburn have low yields even for sandstone of the Gettysburg Formation; the cause is not apparent.

Structure

Faults

Specific capacities of wells in sandstone of the Hammer Creek Formation that are within 400 feet of mapped faults were compared with specific ca-

Table 8. *Specific Capacities of Domestic Wells*[1]

Geologic unit	Median depth of wells used in frequency distribution, in feet	Number of wells used in frequency distribution	Specific capacity, in gallons per minute per foot of drawdown, exceeded by indicated percentage of wells[2]				
			10 percent	25 percent	50 percent (median)	75 percent	90 percent
Diabase	102	59	0.54	0.29	0.12	0.04	0.01
Gettysburg Formation	140	131	.70	.38	.18	.09	.04
Quartz conglomerate	160	2	—	—	.20	—	—
Limestone conglomerate	68	3	—	—	.38	—	—
Sandstone	160	89	.65	.34	.18	.08	.03
Shale	122	37	.77	.41	.19	.10	.05
Hammer Creek Formation	110	165	3.0	1.0	.45	.22	.10
Quartz conglomerate	123	33	4.0	1.4	.53	.15	.04
Sandstone	100	69	3.0	1.0	.50	.24	.12
Shale	110	63	2.3	.83	.42	.17	.09

[1] Includes a few stock and commercial wells.

[2] Specific-capacity data are not adjusted to a common period of time, but almost all were measured after 1 or 2 hours.

Table 9. *Specific Capacities of Nondomestic Wells*[1]

Geologic unit	Median depth of wells used in frequency distribution, in feet	Number of wells used in frequency distribution	Specific capacity, in gallons per minute per foot of drawdown, exceeded by indicated percentage of wells[2]				
			10 percent	25 percent	50 percent (median)	75 percent	90 percent
Diabase	300	6	15	0.70	0.07	0.01	0.01
Gettysburg Formation	450	103	6.6	2.6	1.0	.34	.12
Quartz conglomerate	498	6	3.9	.60	.22	.07	.01
Limestone conglomerate	196	7	17	10	5.8	.34	.04
Sandstone	300	27	1.6	1.0	.47	.28	.05
Shale							
Middletown area	500	28	16	6.7	2.4	1.0	.70
Excluding Middletown area	412	34	3.2	1.9	1.0	.28	.12
Hammer Creek Formation	300	64	12	3.3	1.2	.61	.32
Quartz conglomerate	275	8	3.3	3.0	.90	.30	.02
Sandstone	265	38	14	4.0	.98	.59	.32
Shale	327	17	10	4.2	2.0	.60	.39

[1] Includes public-supply, industrial, air conditioning, and irrigation wells.

[2] Specific-capacity data are not adjusted to a common period of time, but most were measured after 4 to 72 hours.

pacities of all wells in that unit. No statistically significant difference was found between the two groups. This suggests that faulting has not affected well yields from sandstone. Fine-grained fault gouge may impede flow in shale, but too few data are available to draw definite conclusions.

Biemesderfer and Leske (1961, p. 40) observed that in sinking shafts at the Grace Mine at Morgantown, "Both . . . shafts intersected high angle faults that persisted inside the excavation line through most of the shaft depths. Maximum flows occurred, (1) at the junction of the faults and the lower contact of diabase sills, and (2) at the junction of faults and shattered quartzite. The faults also served as low permeability barriers where gouge or breccia was not present or was tightly cemented." Even though the shafts are probably in the Stockton Formation, the relation of flow to faults is probably similar to that in the Hammer Creek and Gettysburg Formations.

Dip

Well yield and specific capacity decrease with increasing dip of the strata. Nondomestic wells in valleys in sandstone of the Hammer Creek Formation were divided into two groups: those drilled in rocks dipping more than 30 degrees and those in rocks dipping 30 degrees or less. The wells in the 30-degree-or-less group had a median specific capacity of 1.8 gpm/ft and a median yield of 171 gpm. Those in the more steeply dipping rocks had a median specific capacity of 1.0 gpm/ft and a median yield of 96 gpm. Nondomestic wells in valleys in shale of the Gettysburg Formation were split into two similar groups. The wells in rocks dipping less than 30 degrees had a median specific capacity of 1.0 gpm/ft and a median yield of 135 gpm. Those in the more steeply dipping rocks had a median specific capacity of 0.24 gpm/ft and a median yield of 35 gpm. If yielding zones of the Triassic sedimentary rocks are limited to a few beds that are more permeable than the rest of the rocks, decreasing yield is to be expected with increasing dip, as fewer yielding zones will be encountered per foot of hole drilled at higher dips. Also, a well in steeply dipping beds tends to be closer to barriers to flow than a well in gently dipping beds.

Fracture Traces and Lineaments

Fracture traces are defined as natural linear features consisting of topographic (including straight stream segments), vegetational, or soil-tonal alignments, which are visible primarily on aerial photographs. Both natural lineaments and fracture traces are probably the surface expression of vertical or nearly vertical fractures (individual joints, zones of closely spaced joints, or small-scale faults) in the underlying bedrock. Identification of fracture traces and lineaments on aerial photographs must be done with care, however, and features such as pipelines, telephone and power lines,

abandoned roads and railroads, fence lines and surveyors' cut lines, animal trails, minibike trails, and snowmobile tracks should be avoided. Thus, the features should be field checked.

Hydrologists and geologists in other areas have reported that wells drilled on fracture traces have higher yields than randomly located wells (Lattman and Parizek, 1964; Parizek and Drew, 1966). Linear features in the project area were mapped on aerial photographs (scale 1:20,000) and then transferred to Plate 1. These features, however, were not field checked.

A total of 19 nondomestic wells in the Hammer Creek and Gettysburg Formations are known to have been drilled on fracture traces identified by hydrogeologists. The specific capacity for each of these wells was compared with that of all nondomestic wells in the same formation, lithology, and topographic setting. These data are given in Table 10. Of the 19 wells, nine had a higher specific capacity than the median for their group, two were the same, and eight were lower. This suggests that in the Gettysburg and Hammer Creek Formations, wells on fracture traces do not have significantly higher specific capacities and yields.

Depth of Water-Bearing Zones

The yield of a well depends largely on the size and distribution of water-bearing zones open to the well. Table 11 shows the distribution of water-bearing zones with depth. Decreases in the number of zones below about 250 feet are due in part to lack of data pertaining to those depths and to the difficulty of identifying yielding zones after several zones have been penetrated. However, the data clearly show that the number of zones decreased with depth, especially in the diabase. Also, the coarser grained rocks have more openings in the first 100 feet than the shale, but the number of zones in the coarser rocks decreases more rapidly with depth.

An analysis of data from wells for which the yields and depths of individual zones are known shows that the specific capacities of yielding zones generally decrease with depth. However, because the deeper zones have much greater available drawdown, they may contribute more water to pumping wells than the shallower zones. For example, a yielding zone having a specific capacity of 0.2 gpm/ft penetrated 50 feet below the water table can yield a maximum of 10 gpm. A zone having only one half this specific capacity penetrated 500 feet below the water table can yield a maximum of 50 gpm.

Data on water-bearing zones deeper than 600 feet are available for only four wells. Three of the wells, which range in depth from 655 to 815 feet, penetrated at least one yielding zone below 600 feet. Data available on the yields of the individual zones in two of these wells (Ad–270 and Da–530) show that both wells obtained more than half their yield below 500 feet. A well (Yo–1049) in the Gettysburg Formation in York County penetrated a

Table 10. *Specific Capacities of Nondomestic Wells Located on Fracture Traces*

Well number	Topographic setting	Formation	Lithology	Specific capacity (gpm/ft)	Median specific capacity of all wells in same formation, lithology, and topographic setting (gpm/ft)	Number of wells used in determining the median
Ad- 268	Valley	Gettysburg	Sandstone	0.20	0.16	10
269	do.	do.	do.	.05	.16	10
270	do.	do.	Shale	.55	.97	14
290	do.	do.	Sandstone	.02	.16	10
343	do.	do.	do.	1.1	.16	10
344	do.	do.	do.	.12	.16	10
346	do.	do.	Limestone conglomerate	6.6	6.2	4
Be- 82	do.	Hammer Creek	Sandstone	.59	1.3	17
316	do.	do.	Quartz conglomerate	3.2	2.8	5
1251	do.	do.	do.	.69	2.8	5
1252	do.	do.	do.	2.8	2.8	5
1277	do.	do.	Shale	4.6	1.4	8
1281	do.	do.	Sandstone	.30	1.3	17
Ch- 2149	do.	do.	do.	11	1.3	17
Da- 530	Hilltop	Gettysburg	do.	1.0	.56	9
Ln- 1306	Valley	Hammer Creek	do.	3.1	1.3	17
1310	do.	do.	do.	1.3	1.3	17
1405	do.	do.	do.	5.7	1.3	17
798	do.	do.	do.	1.2	1.3	17

Table 11. *Distribution of Water-Bearing Zones with Depth*

Lithology	Number of zones for which data were available	Number of water-bearing zones penetrated by drilled wells per 100 feet of hole sampled[1]								
		0-50 feet	51-100 feet	101-150 feet	151-200 feet	201-250 feet	251-300 feet	301-350 feet	351-400 feet	Below 400 feet
Diabase	184	3.4	1.9	0.9	0.8	0.6	0.5	0.8	1.9	—
Gettysburg Formation	505	1.8	1.9	1.6	1.3	1.0	.7	1.1	.6	.4
Sandstone	267	2.1	2.2	1.5	1.4	.8	.7	1.0	.3	.8
Shale	198	1.5	1.5	1.8	1.5	1.3	.7	1.1	1.3	.1
Hammer Creek Formation	656	3.4	3.4	2.6	1.9	1.6	1.7	1.0	.3	1.1
Quartz conglomerate	126	3.1	2.8	2.2	2.0	.6	1.2	.5	.0	1.0
Sandstone	295	3.4	3.8	2.5	1.5	1.5	1.9	1.4	.5	—
Shale	233	3.5	3.4	3.0	2.5	3.3	2.4	1.3	—	—
All sedimentary rocks	1169	2.4	2.7	2.0	1.6	1.2	1.0	1.1	.5	.4
Conglomerate	149	2.9	2.8	2.0	1.7	.7	1.1	.4	.0	.6
Sandstone	566	2.6	3.0	1.8	1.4	1.0	1.0	1.1	.4	.9
Shale	435	2.2	2.3	2.2	1.9	1.9	1.0	1.2	1.2	.1

[1] Based on data reported by drillers. Depths below land surface are given in 50-foot increments to 400 feet. For each depth interval shown, the total number of water-bearing zones penetrated by all the wells for which data are available has been multiplied by 100 and divided by the total footage that was drilled in that depth interval. As drillers very rarely report information above the bottom of the casing, the cased footage is not included in the footage sampled. Also, the footage that lies above the water table is not included.

zone yielding fresh water at about 2,300 feet below land surface. This indicates that, where the need is great enough, drilling water wells deeper than 1,000 feet may be justified.

Well Construction and Spacing

Most wells in the basin are drilled either by cable-tool or air-blown-rotary methods. Both methods have advantages in certain circumstances, and wells drilled by either method can be expected to produce about the same yields. Because well yield increases only slightly with increased diameter, well diameters larger than 6¼ inches are usually drilled only to accommodate large pumps.

Pumping of a well will cause the water level, and eventually the yield, of nearby wells to decline. Wells on a line parallel to the strike of the beds will show more interference than wells on a line perpendicular to the strike. Pumping tests show that new wells along the strike and within about 1,500 feet of older wells will significantly reduce the yields of the older wells. Generally, wells on a line perpendicular to strike show little interference if the wells do not penetrate the same strata. Wells perpendicular to the strike that are close enough to penetrate the same strata will show considerable interference.

Well Development

The yields of wells in some aquifers may be increased by well-development techniques such as surging, wire brushing, and fracturing the rock with air or water under high pressure. Few, if any, of the attempts to fracture the rock with explosives have improved the yield of the well. Treating wells with chemicals has rarely been tried in the study area. Kohl Brothers (written communication, 1953) did surge one well (Da–81) with 540 pounds of Calgon[1] and 25 pounds of calcium hypochlorite for 48 hours. The surging increased the specific capacity of the well by 14 percent. When the same treatment was repeated for another 48 hours the additional improvement was 2 percent.

QUALITY OF WATER

The chemical quality of groundwater is governed chiefly by the nature of the soil and rock through which the water passes and by the length of time the water has been in contact with these materials. Part of the mineral matter in groundwater is derived from the atmosphere. The mean concentration

[1] The use of the brand name in this report is for identification purposes only and does not imply endorsement by the U. S. Geological Survey.

of dissolved solids in precipitation is 13 mg/l (milligrams per liter). Dissolved solids are concentrated by evaporation and transpiration, and precipitation may account for about 35 mg/l of the dissolved solids reaching the groundwater system. In addition, the discharge of sewage into septic tanks or cesspools, the spreading of fertilizers and insecticides on croplands, the burial of refuse, and accidental spills of chemicals may affect the type and amount of dissolved matter that occurs in groundwater.

Laboratory analyses by the U. S. Geological Survey of the major ionic constituents that normally occur in groundwater are given in Table 12 for 26 wells and one spring in diabase and in Table 13 for 66 wells and two springs in the Gettysburg and Hammer Creek Formations. The analyses in Tables 12 and 13 are summarized in Table 14, which gives median concentrations of chemical constituents in water from selected lithologic units. Laboratory analyses of 17 trace elements are given in Table 15 for six wells in the diabase and in Table 16 for 28 wells in the Gettysburg and Hammer Creek Formations.

The following herbicides and pesticides were analyzed but not detected in samples of water from four wells (Ad–164, Ad–355, Da–526, and Yo–860): Aldrin, Chlordane, DDD, DDE, DDT, Diazinon, Dieldrin, Endrin, Ethyl Parathion, Ethyl Trithion, Ethion, Heptachlor Epoxide, Heptachlor, Lindane, Malathion, Methyl Parathion, Methyl Trithion, polychlorinated biphenyls (PCB), polychlorinated naphthalenes (PCN), Silvex, Toxaphene, 2, 4–D2, 4-DP, and 2,4,5–T.

Field measurements of specific conductance and hardness were made at about 530 wells, pH was determined at 180, and temperature measurements were made at 64. These measurements are given together with well data in Table 17.

The field measurements of hardness were determined in grains per gallon, but the approximate concentration in milligrams per liter may be calculated by multiplying these values by 17.1. The hardness of the water sampled ranged from 1 to 33 grains per gallon, or from soft to very hard (Swenson and Baldwin, 1965, p. 17). The water is chiefly a calcium bicarbonate type and has good chemical quality except where locally contaminated. It contains low to moderate amounts of dissolved mineral matter and, with the exception of some water that may require treatment for hardness, is generally satisfactory for most purposes.

No attempt was made to evaluate the sanitary quality of the water. However, many well owners have had their wells tested for coliform bacteria, and the vast majority report that none was detected. Wells in areas underlain by diabase are the most likely to show the presence of coliform bacteria, as most of the water pumped from this formation comes from shallow depths.

Trace-element concentrations are generally low. Only one constituent (lead) in one well (Yo–935) exceeded the maximum allowable concentra-

Table 12. *Chemical Analyses of Water from the Diabase*

Well or spring number	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (μg/l)	Dissolved manganese (Mn) (μg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180°C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Ad– 250	25-10-29	36	170	—	53	27	1.7[a]	—	155	59	13	—	11	—	—	—	—	333	—	240	120	—	—
377	76-11-17	51	90	20	30	18	4.5	0.4	128	44	4.4	0.1	1.1	0.01	0.01	0.02	0.01	215	221	150	44	300	6.4
Be– 1212	76-05-11	29	30	0	19	7.5	4.9	.1	56	36	4.1	.1	.16	.01	.02	.00	.01	132	129	78	33	—	6.2
Ch– 2321	75-04-01	19	110	30	10	7.0	2.8	.1	45	17	3.6	.0	.18	.00	.03	.00	.00	102	84	54	17	130	6.0
Da– 101	63-01-11	—	—	—	38	18	—	—	150	38	—	—	—	—	—	—	—	288	—	170	46	361	7.3
382	65-09-29	43	130	0	30	13	51	.3	99	45	6.5	.0	1.9	—	—	—	—	225	246	130	47	283	6.8
	66-08-12	40	170	0	34	15	4.8	.6	101	52	6.7	.1	2.5	—	—	—	—	227	214	150	64	300	7.0
	67-07-13	36	260	0	37	16	5.8	.4	106	61	7.0	.0	3.2	—	—	—	—	268	230	160	71	330	6.8
525	76-05-13	38	10	0	44	23	5.6	.5	153	42	26	.0	4.6	.01	.01	.00	.02	298	276	200	79	—	6.5
Ln– 1324	76-05-12	45	110	10	22	10	2.9	.1	86	30	2.3	.0	.24	.01	.01	.04	.01	162	156	96	26	—	6.1
Lb– 206	59-10-13	42	410	30	33	9.9	9.2	.7	101	35	7.2	.1	2.7	—	—	—	—	205	199	120	40	275	6.7
230	59-10-12	36	60	0	71	28	14	.8	95	64	39	.1	33	—	—	—	—	423	446	290	220	676	6.5
Yo-Sp– 14	27-11-02	25	40	—	29	19	9.1	1.6	132	46	7.0	—	1.4	—	—	—	—	222	208	150	42	—	—
Yo– 207	61-02-23	9.8	210	150	49	21	19	18	82	73	29	.0	27	—	—	—	—	—	380	210	140	594	6.4
550	68-03-29	36	20	0	40	18	33	4.3	170	62	25	.3	2.0	—	—	—	.03	319	303	170	35	480	8.1
552	68-04-05	37	1900	70	37	22	7.9	1.1	186	28	14	.0	.02	—	—	—	.03	239	246	180	30	373	8.1
553	68-04-05	44	0	0	30	17	6.3	.9	142	27	7.5	.0	.14	—	—	—	.00	210	203	150	28	295	7.9
554	68-04-05	21	190	10	46	13	6.7	1.8	161	42	3.0	.1	.68	—	—	—	.03	231	217	170	36	341	7.9
555	68-04-05	7.9	1400	90	36	24	8.6	5.4	190	23	20	.0	.36	—	—	—	.00	230	222	190	33	407	8.1
556	68-04-05	22	180	60	82	25	13	15	322	60	22	.0	.61	—	—	—	.00	404	404	310	44	640	8.1
735	68-04-25	37	0	10	40	9.8	5.5	2.3	125	33	4.8	.0	2.5	—	—	—	.00	220	205	140	38	303	7.6
737	68-04-25	22	20	10	19	8.5	8.0	.5	58	37	5.5	.0	2.3	—	—	—	.00	159	139	82	35	214	7.2
738	68-04-25	23	0	10	48	17	7.0	5.2	136	60	9.0	.0	5.0	—	—	—	.03	282	258	190	78	411	7.7
740	68-04-25	45	110	20	38	18	15	4.0	89	48	26	.1	11	—	—	—	.03	313	289	170	96	430	7.3
742	68-04-25	39	0	0	40	20	8.0	3.5	110	57	14	.0	8.4	—	—	—	.00	298	273	180	92	407	7.4
817	25-11-02	24	200	—	5.5	4.3	6.8	1.3	49	4.6	5.0	—	.34	—	—	—	—	83	78	31	0	—	—
834	68-07-02	—	—	—	344	—	18	.8	72	—	1180	—	—	—	—	—	—	—	—	—	—	3680	8.0
	69-01-24	13	190	10	365	210	50	1.3	62	19	1260	.0	2.3	—	—	—	—	2130	1960	1800	1700	4080	6.9
835	69-11-11	49	—	—	105	55	9.1	.8	56	20	315	.0	4.5	—	—	—	—	746	601	490	440	1200	7.8
1015	76-11-16	49	50	0	25	14	7.1	.7	116	31	3.6	.1	2.1	.00	.01	0.4	.01	190	197	120	25	260	6.2

[a] Sodium plus potassium as sodium.

Table 13. *Chemical Analyses of Water from the Gettysburg and Hammer Creek Formations*

Lithology: Lscg, limestone conglomerate; Qzcg, quartz conglomerate; Sh, shale; Ss, sandstone; Shss, sandy shale of the Middletown area.

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Ad-Sp- 2	Sh	25-10-31	22	70	—	209	8.3	—	103	—	148	581	41	—	—	—	—	—	—	1106	—	560	440	—	—
Ad- 62	Ss	61-02-28	22	30	40	66	22	15	—	1.0	246	45	16	0.0	4.5	—	—	—	—	337	328	260	54	535	7.2
136	Sh	60-11-23	16	140	20	56	13	42	—	2.5	211	55	18	.3	10	—	—	—	—	353	351	190	20	553	7.4
137	Sh	60-10-31	18	40	20	64	16	18	—	.8	216	41	14	.0	5.4	—	—	—	—	300	302	230	49	478	7.4
146	Ss	68-05-15	22	780	0	37	12	8.0	—	1.1	134	24	4.0	.0	3.8	—	—	—	—	204	192	140	32	360	8.2
		73-11-20	20	2100	20	54	13	9.0	—	1.0	184	26	4.2	.2	9.7	.00	—	—	.01	264	263	190	37	389	8.0
		74-05-20	22	420	0	53	13	9.3	—	.9	181	27	4.1	.0	—	—	—	—	.01	247	243	190	38	400	7.3
		74-10-18	22	110	0	53	12	9.1	—	.6	187	27	3.5	.1	4.8	.03	—	—	.02	248	241	180	28	395	7.3
		75-05-15	24	10	10	54	13	8.6	—	.8	190	28	3.5	.0	5.4	.00	.00	.04	.02	263	250	190	33	405	7.2
		75-12-09	—	5400	70	22	9.5	8.6	—	1.3	114	—	—	—	.61	.03	10	.42	.01	—	—	94	1	242	7.4
164	Qzcg	76-11-18	19	—	0	22	7.0	3.3	—	1.3	91	2.9	2.1	.1	1.5	.00	.00	.08	.03	107	116	84	9	175	6.5
241	Sh	25-10-30	24	80	—	73	19	—	14	—	190	82	27	—	3.2	—	—	—	—	377	—	260	110	—	—
244	Sh	25-10-30	16	140	—	76	27	—	14	—	277	25	57	—	.27	—	—	—	—	371	—	300	74	—	—
346	Lscg	76-11-17	14	100	30	57	4.3	7.6	—	2.4	162	14	9.9	.1	2.7	.01	.00	.08	.01	198	201	160	27	330	6.6
355	Sh	76-11-17	14	80	0	64	19	7.1	—	1.0	252	28	7.1	.1	3.1	.00	.00	.00	.02	270	279	240	32	450	6.8
367	Ss	76-11-18	26	110	0	45	12	14	—	3.8	188	22	7.5	.1	4.0	.01	.00	.15	.03	237	244	160	8	370	7.3
369	Ss	76-11-18	20	20	0	60	15	20	—	.7	273	25	6.2	.2	1.0	.00	.00	.05	.01	273	287	210	0	458	6.9
Be-Sp- 2	Qzcg	25-10-01	30	60	—	8.0	2.3	4.4	—	.7	29	5.0	1.6	—	2.7	—	—	—	—	82	78	29	6	—	—
Be- 50	Ss	25-10-01	11	1400	—	3.4	1.4	3.6	—	.6	54	6.3	.9	—	.61	—	—	—	—	68	58	14	0	—	—
81	Qzcg	25-10-01	22	190	—	7.4	2.8	3.5	—	1.0	32	12	1.0	—	.02	—	—	—	—	66	66	30	4		
127	Qzcg	49-04-22	9.1	170	—	16	4.6	8.2	—	2.1	12	17	12	.0	9.5	—	—	—	—	128	117	59	49	189	5.5
1210	Qzcg	76-05-10	11	20	10	4.6	1.6	1.6	—	.5	20	3.7	1.8	.1	.60	.01	.01	.00	.04	31	38	18	2	—	5.5
1211	Sh	76-05-10	25	370	0	13	4.5	11	—	1.3	18	34	4.7	.1	5.8	.01	.01	.17	.08	124	130	51	37	—	5.6
1213	Ss	76-05-11	12	80	30	6.6	7.6	9.0	—	3.1	11	6.2	24	.0	6.5	.01	.02	.00	.01	108	104	48	39		5.2

Table 13. *(Continued)*

Well or spring number	Lith- ology	Date of sample (yr-mo-day)	Dis- solved silica (SiO_2) (mg/l)	Dis- solved iron (Fe) (µg/l)	Dis- solved man- ganese (Mn) (µg/l)	Dis- solved cal- cium (Ca) (mg/l)	Dis- solved mag- ne- sium (Mg) (mg/l)	Dis- solved sodi- um (Na) (mg/l)	Dis- solved sodi- um plus potas- sium (mg/l)	Dis- solved potas- sium (K) (mg/l)	Bicar- bonate (HCO_3) (mg/l)	Dis- solved sulfate (SO_4) (mg/l)	Dis- solved chlo- ride (Cl) (mg/l)	Dis- solved fluo- ride (F) (mg/l)	Dis- solved nitrate (N) (mg/l)	Dis- solved nitrite (N) (mg/l)	Dis- solved ammo- nia nitro- gen (N) (mg/l)	Dis- solved organic nitro- gen (N) (mg/l)	Dis- solved ortho- phos- phorus (P) (mg/l)	Dis- solved solids (resi- due at 180° C) (mg/l)	Dis- solved solids (sum of consti- tuents) (mg/l)	Hard- ness (Ca, Mg) (mg/l)	Noncar- bonate hard- ness (mg/l)	Spe- cific con- ductance (micro- mhos)	pH
Ch- 181	Sh	63-04-12	22	60	20	42	13	13	—	.2	136	32	8.4	.1	1.8	—	—	—	—	238	206	160	47	361	7.7
1496	Qzcg	76-05-10	10	60	10	.7	.8	1.4	—	.3	5	1.1	2.2	.1	.37	.01	.01	.02	.01	23	21	5	1	—	5.4
1528	Qzcg	74-10-31	21	90	10	15	6.1	8.7	—	.6	64	13	3.1	.1	1.2	.00	.00	.00	.11	132	106	63	10	220	7.0
1547	Sh	74-10-30	27	10	0	32	11	9.7	—	1.8	116	19	7.3	.1	4.4	.00	.00	.00	.12	173	185	130	30	500	7.2
1568	Ss	76-05-10	25	10	0	43	7.0	9.1	—	.8	124	9.2	24	.1	5.0	.01	.01	.00	.30	232	203	140	35	—	6.7
2240	Qzcg	76-05-10	11	50	10	9.2	1.7	1.6	—	.8	40	7.8	2.0	.1	.19	.01	.00	.05	.06	60	55	30	0	—	5.8
Da- 79	Ss	59-06-25	22	50	20	46	4.4	—	7.4	—	130	26	2.6	.1	3.2	—	—	—	—	182	—	130	26	289	7.5
		60-06-21	21	50	0	45	3.2	6.0	—	1.6	118	22	4.2	.1	5.0	—	—	—	—	183	183	130	29	280	8.2
		61-07-19	20	50	50	46	3.4	6.8	—	1.2	115	21	5.8	.1	4.3	—	—	—	—	201	180	130	35	277	7.0
		62-07-17	24	60	30	46	8.0	6.1	—	1.2	127	41	4.1	.0	1.1	—	—	—	—	207	198	150	44	324	6.9
		63-08-22	19	40	0	46	2.9	5.3	—	1.0	118	21	5.6	.0	4.5	—	—	—	—	182	179	130	33	286	7.0
		64-08-11	17	240	0	48	2.4	5.9	—	.8	117	23	7.2	.0	5.2	—	—	—	—	196	185	130	34	306	6.9
		65-08-03	19	0	0	48	4.9	7.0	—	.2	118	26	8.2	.0	5.4	—	—	—	—	208	195	140	43	314	7.1
		66-08-12	22	100	0	52	6.5	6.4	—	1.2	130	32	9.6	.1	5.6	—	—	—	—	197	219	160	50	333	7.5
		67-07-13	17	60	0	54	3.8	6.5	—	1.0	122	28	12	.0	3.8	—	—	—	—	225	199	150	50	317	6.9
80	Shss	53-01-16	25	140	—	104	20	13	—	1.4	166	176	11	.0	3.2	—	—	—	—	476	446	340	210	686	7.7
		53-06-05	—	10	—	103	18	14	—	1.5	188	165	16	.0	3.6	—	—	—	—	510	—	330	180	669	7.8
		54-09-21	25	—	—	105	22	—	6.5	—	152	198	14	.0	4.5	—	—	—	—	537	—	350	230	769	7.8
		55-05-19	23	—	—	83	19	—	26	—	181	155	14	.0	3.6	—	—	—	—	448	—	290	140	645	7.8
		56-05-07	26	90	20	85	32	—	6.4	—	188	162	14	.0	4.3	—	—	—	—	450	—	340	190	675	7.9
		57-06-11	31	70	100	85	16	—	14	—	177	125	12	.1	4.3	—	—	—	—	398	—	280	130	578	7.0
		58-07-23	29	80	0	82	18	—	15	—	188	120	12	.0	4.1	—	—	—	—	394	—	280	130	577	7.2
		60-06-13	31	120	20	88	12	12	—	1.9	197	100	13	.0	5.6	—	—	—	—	427	380	270	110	560	7.9
		61-07-20	28	60	50	78	14	12	—	1.0	186	81	13	.0	5.0	—	—	—	—	359	341	250	100	515	7.1
		62-07-18	24	20	20	92	24	12	—	1.2	199	149	12	.0	1.5	—	—	—	—	454	419	330	170	644	7.0
		63-08-27	26	120	0	98	17	12	—	.8	204	140	14	.0	3.4	—	—	—	—	437	423	320	150	640	7.0
		64-08-12	24	70	0	128	20	16	—	.5	189	213	17	.0	3.2	—	—	—	—	604	526	400	250	807	6.9
		65-07-26	25	20	0	124	28	17	—	.6	195	259	20	.2	3.2	—	—	—	—	653	584	430	270	850	6.8

81 Shss	53-01-16	24	130	—	76	18	7.0	—	1.3	165	90	8.0	.0	4.3	—	—	—	—	337	325	260	130	532	7.9
	53-06-05	—	80	—	75	16	10	—	1.5	188	89	10	.2	4.3	—	—	—	—	410	—	250	99	526	7.9
	54-09-21	24	—	—	81	20	—	4.0	—	160	122	15	.0	3.8	—	—	—	—	419	—	290	150	618	8.0
	55-05-19	25	—	—	83	21	—	18	—	188[a]	135	16	.0	4.1	—	—	—	—	418	—	290	140	613	8.4
	56-05-07	26	30	20	75	21	—	2.5	—	189	88	11	.0	4.7	—	—	—	—	351	—	270	120	529	8.2
	57-06-11	30	50	10	71	15	—	9.9	—	180	80	9.8	.1	4.1	—	—	—	—	344	—	240	91	495	7.3
	58-07-22	26	30	0	76	17	—	7.6	—	182	95	9.0	.0	4.3	—	—	—	—	349	—	260	110	520	7.6
	59-06-23	28	60	0	65	14	—	10	—	178	67	7.9	.2	4.1	—	—	—	—	338	—	220	74	462	7.3
	60-06-15	27	70	0	69	15	9.7	—	1.6	182	74	10	.0	5.0	—	—	—	—	319	318	230	85	482	7.6
	62-07-18	27	50	0	90	19	10	—	1.2	199	122	11	.0	4.1	—	—	—	—	436	396	300	140	593	7.4
	63-08-23	27	20	40	86	19	10	—	.5	216[a]	108	11	.0	3.8	—	—	—	—	407	371	290	120	593	8.5
	64-08-13	24	80	0	88	20	9.6	—	1.0	210	113	10	.0	3.4	—	—	—	—	423	384	300	130	616	7.0
	65-07-26	25	0	0	91	21	12	—	.3	217	130	12	.0	4.1	—	—	—	—	482	416	310	140	638	7.1
	66-08-10	24	110	0	102	22	12	—	1.2	226	143	17	.0	2.9	—	—	—	—	494	445	350	160	666	7.2
	67-07-13	23	70	0	86	17	13	—	1.0	210	103	18	.0	3.4	—	—	—	—	420	380	290	110	585	7.3
82 Shss	53-01-16	25	120	—	98	14	11	—	1.4	162	126	10	.0	5.0	—	—	—	—	406	387	300	170	604	7.3
	53-06-05	—	40	—	86	9.7	10	—	1.3	192	83	13	.0	5.0	—	—	—	—	410	—	260	97	539	7.6
	54-09-21	25	—	—	91	11	—	6.7	—	159	102	26	.0	3.8	—	—	—	—	396	—	270	140	587	8.2
	55-05-19	26	—	—	87	9.9	—	8.9	—	182[a]	86	14	.0	5.2	—	—	—	—	367	—	260	110	536	8.4
	56-05-07	28	0	0	92	15	—	7.1	—	195	101	14	.0	6.1	—	—	—	—	395	—	290	130	586	7.7
	57-06-11	30	80	50	69	7.5	—	9.0	—	173	43	8.8	.1	6.3	—	—	—	—	290	—	200	200	429	7.2
	58-07-22	26	80	0	80	7.9	—	8.5	—	185	63	10	.0	5.4	—	—	—	—	333	—	230	81	495	7.3
	59-06-23	32	40	0	75	4.3	—	17	—	190	50	8.8	.2	5.6	—	—	—	—	317	—	210	49	463	7.9
	60-06-14	28	60	0	68	6.1	9.7	—	1.2	182	33	9.5	.0	6.8	—	—	—	—	278	275	200	46	420	7.4
	61-07-21	30	20	50	84	10	12	—	1.0	192	72	12	.1	6.1	—	—	—	—	359	343	250	93	508	7.3
	62-07-19	28	10	30	62	19	9.4	—	1.0	195	58	11	.0	1.4	—	—	—	—	324	291	230	73	502	7.1
	63-08-23	26	60	20	90	10	11	—	.2	206	80	14	.0	4.5	—	—	—	—	370	337	640	470	552	7.1
	64-08-11	25	80	0	88	12	11	—	.5	205	82	12	.0	5.9	—	—	—	—	377	358	270	100	564	7.1
	65-07-26	25	20	0	104	16	15	—	.2	193	149	19	.1	4.5	—	—	—	—	479	443	330	170	679	7.1
	66-08-10	27	100	0	78	8.8	9.6	—	.9	194	49	11	.0	6.6	—	—	—	—	311	309	230	72	466	7.3
	67-07-12	23	70	0	94	13	14	—	.9	200	102	18	.0	3.6	—	—	—	—	415	379	290	120	577	7.3
83 Shss	53-01-16	17	120	—	95	26	11	—	1.6	150	198	7.0	.0	2.7	—	—	—	—	478	442	340	220	670	7.6
	53-06-05	—	40	—	90	24	11	—	1.6	172	177	9.0	.0	3.6	—	—	—	—	520	—	320	180	654	7.9
	54-09-21	22	40	—	75	23	—	24	—	135	188	12	0	3.2	—	—	—	—	470	—	280	170	668	8.1
	55-05-19	25	—	—	75	20	—	11	—	158	134	10	.0	3.2	—	—	—	—	400	—	270	140	565	7.8
	56-05-07	23	20	20	84	25	—	5.1	—	170[a]	156	6.7	.0	3.4	—	—	—	—	413	—	310	170	599	8.3
	57-06-11	28	100	10	56	15	—	10	—	144	80	5.8	.1	3.6	—	—	—	—	296	—	200	83	437	7.2
	58-07-23	24	70	20	69	17	—	4.8	—	154	103	6.2	.1	2.9	—	—	—	—	372	—	240	120	497	6.6

Table 13. (Continued)

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Da-	83 Shss	59-06-23	27	40	10	48	13	—	3.2	—	135	47	4.8	.1	3.8	—	—	—	—	259	—	170	63	371	7.6
		60-06-14	26	120	0	44	13	5.8	—	1.1	148[a]	40	5.4	.1	3.2	—	—	—	—	230	223	160	42	350	8.4
		61-07-21	24	50	70	52	14	9.0	—	1.0	143	59	6.4	.0	4.3	—	—	—	—	271	255	190	70	390	7.3
		62-07-19	24	50	0	77	17	8.4	—	1.2	184	101	7.8	.0	2.9	—	—	—	—	362	340	260	110	527	7.5
		63-08-23	23	160	70	80	23	10	—	.2	180	138	8.6	.0	3.8	—	—	—	—	399	389	290	150	584	7.4
		64-08-11	19	170	0	83	18	9.1	—	.2	201	102	10	.1	2.9	—	—	—	—	405	353	280	120	577	7.7
		65-07-27	22	0	0	85	24	13	—	.3	188	154	8.4	.0	3.2	—	—	—	—	475	413	310	160	636	7.2
		66-08-11	23	40	0	80	19	8.7	—	1.2	203	94	12	.0	2.9	—	—	—	—	371	351	280	110	539	7.2
		67-07-12	21	70	0	94	24	18	—	1.3	187	176	13	.0	2.7	—	—	—	—	514	451	330	180	661	7.0
	84 Shss	53-01-16	27	120	—	260	37	40	—	2.5	118	671	27	.1	6.1	—	—	—	—	1240	1150	800	710	1500	7.9
		53-06-05	—	50	—	270	37	47	—	1.9	140	708	36	.1	7.0	—	—	—	—	1340	—	830	710	1550	7.9
		54-09-21	27	—	—	254	41	—	61	—	113	730	38	.1	7.9	—	—	—	—	1460	—	800	710	1690	8.0
		55-05-19	27	—	—	183	27	—	30	—	118	461	15	.2	3.8	—	—	—	—	857	—	570	470	1110	7.8
		55-05-23	17	—	—	60	12	—	14	—	152[a]	79	11	.0	1.8	—	—	—	—	290	—	200	75	435	8.3
		56-05-10	28	30	20	176	45	—	1.4	—	164	434	16	.1	5.0	—	—	—	—	820	—	630	490	1170	8.0
		57-06-18	31	670	90	79	11	—	14	—	166	104	7.7	.1	4.5	—	—	—	—	347	—	240	110	510	7.3
		58-07-25	29	260	30	154	18	—	27	—	166	337	8.8	.3	4.5	—	—	—	—	676	—	460	320	901	7.6
		59-06-22	30	60	10	104	11	—	14	—	173	157	9.0	.0	5.0	—	—	—	—	453	—	310	160	637	7.5
		60-06-13	28	60	10	133	13	18	—	1.7	170	234	11	.1	5.4	—	—	—	—	563	547	390	250	764	7.7
		61-07-19	28	30	50	71	11	13	—	1.0	170	71	11	.1	5.6	—	—	—	—	325	315	220	83	475	7.3
		62-07-18	24	20	20	204	68	41	—	1.6	149	632	28	.0	3.2	—	—	—	—	1270	1090	790	670	1470	7.3
		63-08-23	28	0	50	262	32	39	—	.8	158	640	24	.2	7.7	—	—	—	—	1220	1140	790	660	1460	7.3
		64-08-13	26	210	0	268	42	44	—	.8	149	686	28	.1	7.9	—	—	—	—	1320	1200	840	720	1530	7.5
		65-07-29	28	20	0	292	38	50	—	.2	143	810	36	.2	8.8	—	—	—	—	1450	1360	890	770	1650	7.5
		66-08-17	23	80	0	175	20	26	—	1.2	171	378	12	.1	1.4	—	—	—	—	788	726	520	380	976	7.6
		67-07-12	22	90	0	162	17	28	—	1.2	179	347	15	.0	3.2	—	—	—	—	758	695	480	330	936	7.4

85 Shss	53-01-16	18	—	—	71	24	15	—	1.3	145	147	7.0	.0	3.2	—	—	—	—	384	369	280	160	577	7.7
	53-06-05	—	80	—	68	22	16	—	1.5	172	129	8.5	.0	3.2	—	—	—	—	450	—	260	120	560	7.9
	54-01-12	14	—	—	60	13	—	5.7	—	122	72	9.0	.2	7.7	—	—	—	—	270	—	200	100	418	7.9
	54-09-21	19	—	—	56	13	—	6.2	—	122	79	11	.0	2.5	—	—	—	—	298	—	190	93	449	8.1
	55-05-23	17	—	—	60	12	—	14	—	152[a]	79	11	.0	1.7	—	—	—	—	290	—	200	75	435	8.3
	56-05-09	21	0	20	61	14	—	4.7	—	148	73	9.0	.1	2.7	—	—	—	—	278	—	210	89	430	7.9
	57-06-12	18	80	0	71	4.0	—	25	—	148	101	8.4	.1	2.5	—	—	—	—	314	—	190	72	475	7.7
	58-07-25	15	220	0	118	17	—	16	—	115	274	10	.1	1.5	—	—	—	—	554	—	370	270	720	7.2
	59-06-23	14	50	20	212	27	—	27	—	106	567	12	.2	.86	—	—	—	—	960	—	640	550	1180	7.1
	60-06-16	17	110	0	177	26	18	—	8.8	130	466	13	.1	1.2	—	—	—	—	809	795	550	440	1040	8.2
	61-07-25	15	130	50	228	25	18	—	9.4	118	573	14	.0	1.3	—	—	—	—	1020	946	580	480	1210	6.8
	62-07-19	13	30	10	320	32	24	—	26	86	890	12	.1	.16	—	—	—	—	1440	1360	930	860	1620	7.0
	63-08-23	16	110	0	276	27	22	—	22	124	702	14	.1	1.2	—	—	—	—	1140	1150	800	700	1470	7.0
	64-08-18	13	80	0	128	20	16	—	8.5	152	267	16	.1	2.3	—	—	—	—	615	554	400	280	834	6.9
	65-07-30	14	20	0	256	31	17	—	14	128	688	16	.2	.86	—	—	—	—	1190	1100	770	660	1410	6.9
	66-08-12	20	270	0	220	27	18	—	14	147	516	17	.2	1.7	—	—	—	—	968	912	660	540	1150	7.0
	67-07-16	13	130	0	102	15	15	—	5.9	158	179	18	.0	2.9	—	—	—	—	476	439	320	190	660	6.8
86 Shss	53-01-16	21	—	—	87	17	10	—	1.5	198	93	9.0	.0	3.4	—	—	—	—	370	351	290	130	580	7.3
	53-06-05	—	280	—	90	16	11	—	1.6	236	92	12	.0	3.2	—	—	—	—	407	—	290	97	586	8.0
	54-09-21	22	—	—	79	15	—	20	—	239	77	11	.0	2.9	—	—	—	—	380	—	260	63	574	8.2
87 Shss	53-01-16	20	—	—	66	11	7.9	—	1.4	169	46	9.0	.0	1.4	—	—	—	—	270	251	210	71	434	7.5
	53-06-05	—	590	—	66	10	10	—	1.6	196	50	10	.0	1.2	—	—	—	—	350	—	210	45	431	7.6
	54-09-21	21	—	—	57	12	—	3.2	—	164	42	11	.0	1.4	—	—	—	—	301	—	190	57	429	7.9
	55-05-23	22	—	—	62	15	—	7.9	—	192	52	12	.2	1.3	—	—	—	—	292	—	220	59	450	8.0
	56-08-11	18	2400	320	62	14	—	8.3	—	164	75	7.3	.1	2.1	—	—	—	—	297	—	210	78	431	8.1
	57-06-20	23	5900	1200	58	11	—	9.7	—	180	45	5.6	.1	2.1	—	—	—	—	266	—	190	42	403	7.8
	58-07-24	21	1600	90	53	12	—	7.8	—	172	41	5.5	.1	1.8	—	—	—	—	268	—	180	41	380	7.8
88 Shss	53-12-29	16	—	—	129	29	—	2.6	—	264	207	9.5	.1	.36	—	—	—	—	560	—	440	230	822	7.1
	54-02-26	20	—	—	73	20	—	2.0	—	150	109	6.5	.2	6.3	—	—	—	—	356	—	270	140	523	7.9
	55-05-23	17	—	—	77	20	—	6.4	—	172	122	11	.0	1.3	—	—	—	—	350	—	280	130	553	8.2
	56-05-09	17	60	30	81	18	—	12	—	204	115	7.0	.0	1.7	—	—	—	—	368	—	280	110	556	8.0
	57-06-12	22	150	70	98	22	—	15	—	210	172	7.5	.1	1.7	—	—	—	—	462	—	340	160	652	7.1
	58-07-22	20	80	30	154	31	—	23	—	218	345	9.5	.1	2.5	—	—	—	—	727	—	510	330	980	8.0
	59-06-23	20	50	20	188	34	—	28	—	180	485	9.2	.2	1.1	—	—	—	—	905	—	610	460	1160	7.0
	60-06-16	19	60	0	204	34	19	—	18	190	514	12	.1	1.6	—	—	—	—	951	921	650	490	1200	8.2
	61-07-25	23	50	40	86	23	13	—	6.0	200	153	9.8	.1	1.3	—	—	—	—	462	418	310	150	623	7.6
	62-07-17	18	20	10	192	33	17	—	18	190	476	12	.0	.23	—	—	—	—	921	861	620	460	1160	7.2
	63-08-27	17	120	0	186	33	19	—	20	170	460	11	.1	1.9	—	—	—	—	890	838	600	460	1140	7.4
	64-08-18	17	0	0	96	27	14	—	6.4	210	170	11	.0	2.7	—	—	—	—	470	457	350	180	691	7.3

Table 13. *(Continued)*

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (μg/l)	Dissolved manganese (Mn) (μg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Da-	88 Shss	65-07-30	17	0	60	200	33	14	—	14	172	508	14	.1	1.4	—	—	—	—	951	891	640	490	1200	8.1
		66-08-16	21	60	0	98	27	14	—	7.0	194	194	11	.0	1.5	—	—	—	—	497	474	360	200	689	7.5
		67-07-16	16	70	—	98	24	15	—	5.3	206	171	14	.0	2.7	—	—	—	—	505	457	340	180	676	7.4
	89 Shss	53-09-21	17	—	—	59	11	—	12	—	198	41	9.0	.0	.32	—	—	—	—	290	—	190	30	475	7.3
		53-09-23	20	—	—	59	11	—	5.5	—	179	40	10	.0	.57	—	—	—	—	255	—	190	46	435	7.9
		56-05-11	25	200	630	45	9.9	—	8.6	—	146	26	7.0	.0	4.3	—	—	—	—	216	—	150	33	317	7.9
		57-06-20	28	—	—	54	8.5	—	7.8	—	163	24	11	.1	3.4	—	—	—	—	237	—	170	36	370	6.9
		58-07-24	25	230	20	53	11	—	5.3	—	170	22	11	.1	2.9	—	—	—	—	240	—	180	38	378	7.5
	90 Shss	55-04-15	15	—	—	31	11	—	23	—	100	64	14	.2	.79	—	—	—	—	214	—	120	41	322	8.2
		57-06-13	24	120	50	71	14	—	10	—	189	75	9.8	.1	2.5	—	—	—	—	320	—	240	80	477	7.2
		58-07-22	21	70	0	86	21	—	7.6	—	181	135	12	.0	3.2	—	—	—	—	468	—	300	150	595	7.6
		59-06-22	24	60	10	116	28	—	13	—	204	236	11	.0	1.4	—	—	—	—	568	—	410	240	787	7.1
		60-06-17	23	30	0	118	23	13	—	1.6	189	231	14	.0	2.2	—	—	—	—	531	526	390	230	784	8.0
		61-07-24	23	60	50	147	31	16	—	2.0	208	321	14	.0	2.3	—	—	—	—	711	667	500	320	922	7.3
		62-07-18	21	30	0	152	34	19	—	2.2	218	328	14	.0	1.2	—	—	—	—	732	683	520	340	934	7.4
		63-08-27	21	140	0	158	36	18	—	2.2	222	358	12	.1	1.4	—	—	—	—	775	721	540	360	1010	7.1
		64-08-17	18	410	0	112	29	14	—	1.5	260	166	18	.0	2.0	—	—	—	—	523	496	400	190	765	7.1
		65-07-28	21	70	—	188	39	14	—	3.0	214	450	19	.0	1.6	—	—	—	—	893	847	630	460	1150	7.7
		66-08-17	21	70	0	155	32	16	—	2.8	225	312	20	.1	1.7	—	—	—	—	742	677	520	330	928	7.3
		67-07-14	18	980	0	110	22	16	—	1.8	275	122	28	.0	1.5	—	—	—	—	515	461	370	140	713	7.1
	91 Shss	55-04-15	14	—	—	67	14	—	14	—	169	87	12	.0	2.5	—	—	—	—	309	—	230	86	465	7.8
		57-06-13	20	310	10	71	11	—	13	—	158	95	9.2	.0	2.5	—	—	—	—	318	—	220	93	476	6.8
		58-07-23	16	60	0	66	13	—	10	—	126	111	12	.0	1.3	—	—	—	—	317	—	220	120	463	7.7
		59-06-22	18	40	0	98	15	—	15	—	133	199	13	.0	1.2	—	—	—	—	454	—	310	200	642	6.8
		60-07-06	16	470	0	114	18	14	—	3.6	118	261	14	.1	1.1	—	—	—	—	524	504	360	260	729	7.2
		61-07-18	17	60	70	122	20	14	—	4.5	152	255	15	.0	1.6	—	—	—	—	582	530	390	260	762	7.1
		62-07-23	18	190	10	156	26	16	—	9.5	173	364	13	.0	.34	—	—	—	—	742	689	500	360	957	7.2

	63-08-22	16	310	40	172	25	17	—	7.0	186	358	15	.1	1.8	—	—	—	—	769	710	530	380	1020	7.1
	64-08-18	15	70	0	96	15	14	—	2.4	198	127	22	.0	1.6	—	—	—	—	433	396	300	140	641	7.0
	65-07-28	18	20	20	148	32	19	—	7.0	205	335	16	.1	1.5	—	—	—	—	744	683	500	330	977	7.1
	66-08-16	18	80	0	135	22	15	—	6.0	216	244	16	.1	2.0	—	—	—	—	606	571	430	250	810	7.3
	67-07-18	16	70	0	94	15	15	—	2.0	214	101	22	.0	2.7	—	—	—	—	414	382	300	120	603	6.9
92 Shss	55-06-06	20	—	—	43	14	—	35	—	221	42	10	.1	.45	—	—	—	—	285	—	170	0	452	7.8
	56-02-08	15	—	—	200	16	—	22	—	84	529	4.5	.2	2.1	—	—	—	—	926	—	570	500	1110	7.7
	57-06-13	26	1200	490	40	9.0	—	5.8	—	118	31	4.6	.1	3.8	—	—	—	—	200	—	140	40	295	7.3
	58-07-28	26	1400	0	44	11	—	9.7	—	128	46	4.8	.0	4.5	—	—	—	—	224	—	160	50	338	7.4
93 Shss	55-06-06	12	—	—	51	15	—	13	—	194	45	7.5	.1	.11	—	—	—	—	257	—	190	30	395	8.1
	57-06-18	24	380	20	101	15	—	9.7	—	196	156	5.8	.1	.79	—	—	—	—	425	—	310	150	604	7.8
	58-07-25	22	160	110	162	27	—	33	—	201	396	6.5	.1	.23	—	—	—	—	792	—	520	350	1000	8.0
	59-06-22	22	40	60	107	17	—	18	—	204	189	5.7	.2	1.2	—	—	—	—	483	—	340	170	680	7.6
	60-06-17	21	50	20	122	17	20	—	4.5	167	265	8.5	.0	.79	—	—	—	—	548	544	380	240	811	8.0
	61-07-18	22	110	40	141	19	21	—	7.2	206	275	10	.0	1.1	—	—	—	—	632	602	430	260	844	7.4
	63-08-22	32	110	0	128	24	19	—	8.4	204	274	9.8	.1	.97	—	—	—	—	630	600	420	250	869	7.2
	64-08-18	17	140	100	132	22	19	—	6.0	223	255	11	.0	1.1	—	—	—	—	598	577	420	240	832	7.2
	65-07-30	18	20	80	124	24	19	—	7.0	205	269	11	.0	.86	—	—	—	—	611	577	410	240	833	7.1
	66-08-11	20	90	400	135	21	17	—	7.6	221	255	12	.1	.84	—	—	—	—	599	581	420	240	803	7.4
	67-07-14	17	130	0	126	20	20	—	5.6	232	236	12	.0	1.2	—	—	—	—	608	556	400	210	790	7.5
102 Ss	63-01-09	24	350	70	4.0	1.7	4.2	—	3.0	22	.4	1.8	.0	2.5	—	—	—	—	61	61	17	0	66	6.1
386 Shss	58-07-28	27	360	0	47	9.7	—	9.4	—	200	4.6	2.5	.0	1.5	—	—	—	—	203	—	160	0	334	7.6
	59-06-24	26	40	30	44	12	—	12	—	186	17	4.4	.1	2.5	—	—	—	—	220	—	160	7	346	7.3
	60-06-21	26	80	0	47	12	9.2	—	1.0	194[a]	19	4.6	.0	2.5	—	—	—	—	220	226	170	7	353	8.5
	61-07-18	25	110	120	50	12	9.9	—	.8	187	22	5.3	.0	2.9	—	—	—	—	235	230	170	17	370	7.7
	62-07-17	22	280	20	52	11	8.3	—	.9	188	26	6.2	.0	.81	—	—	—	—	238	223	180	21	365	7.6
	63-08-22	21	0	20	53	11	9.8	—	.2	184	27	9.6	.0	2.9	—	—	—	—	238	235	180	27	373	7.5
	64-08-11	21	180	0	50	14	9.0	—	.2	190	25	7.0	.0	2.3	—	—	—	—	239	230	180	24	383	7.4
	65-08-03	21	210	0	50	14	9.8	—	.3	184	30	7.7	.2	2.5	—	—	—	—	256	235	180	32	395	7.5
	66-08-12	21	50	0	55	12	9.4	—	.8	187	31	10	.0	2.3	—	—	—	—	248	242	190	33	385	7.7
388 Sh	59-03-27	18	200	0	53	12	4.2	—	2.1	170	28	4.6	.0	5.6	—	—	—	—	241	231	180	42	357	7.4
510 Ss	76-05-13	17	80	10	12	4.7	5.6	—	.6	49	6.3	3.8	.1	3.9	.01	.02	.00	.02	95	93	49	9	—	6.3
526 Ss	76-05-13	16	0	0	83	12	11	—	.6	217	35	35	.1	5.2	.01	.00	.05	.05	338	324	260	80	—	6.7

Table 13. *(Continued)*

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Ln– 511	Ss	61-03-01	20	100	0	23	7.1	10	—	2.3	78	13	10	.0	5.2	—	—	—	—	150	147	87	23	223	6.5
1313	Sh	76-06-02	17	50	0	62	4.1	28	—	6	133	110	5.2	.1	3.6	.01	.01	.00	.02	407	310	170	64	455	7.6
1323	Sh	76-05-11	12	30	10	8.7	1.5	1.7	—	1.0	32	11	2.0	.0	.20	.01	.01	.09	.03	51	58	28	2	—	5.6
1325	Ss	76-06-02	7.3	730	40	1.1	.7	.8	—	.3	8	1.2	2.5	.1	.09	.01	.01	.00	.01	25	20	6	0	50	5.0
Lb– 615	Qzcg	59-10-16	18	480	0	38	4.5	3.2	—	.8	116	20	3.4	.0	.05	—	—	—	—	145	146	110	18	251	6.7
720	Ss	63-01-09	40	140	0	42	1.7	6.7	—	1.5	150	.0	2.6	.0	.72	—	—	—	—	173	172	110	0	259	7.0
795	Qzcg	76-06-02	14	130	0	3.5	1.3	2.1	—	.7	16	2.2	2.9	.0	.05	.01	.01	.00	.04	35	35	14	1	50	6.0
798	Ss	76-05-13	23	40	0	20	4.6	5.6	—	.8	80	11	1.5	.1	1.1	.01	.02	.06	.08	116	111	69	3	—	6.8
Yo– 179	Ss	61-02-28	10	70	60	15	3.8	4.2	—	1.2	14	23	6.9	.0	5.0	—	—	—	—	—	96	53	42	144	6.1
548	Sh	68-03-29	37	20	0	60	21	17	—	3.7	230	52	12	.2	1.9	—	—	—	.00	351	325	240	48	496	8.1
551	Ss	68-04-05	42	10	0	25	15	11	—	5.0	160	15	3.5	.0	.60	—	—	—	.10	204	198	120	0	291	8.0
557	Sh	68-04-23	22	450	20	12	5.5	6.0	—	1.3	37	28	3.9	.1	1.0	—	—	—	.00	110	103	53	22	149	7.1
558	Sh	68-04-25	23	0	10	11	5.8	7.5	—	1.7	21	28	7.7	.1	4.3	—	—	—	.07	130	114	51	34	170	6.7
816	Sh	25-11-02	19	460	—	19	3.2	3.9	—	.9	70	5.3	1.6	—	1.9	—	—	—	—	100	96	61	3	—	—
839	Sh	74-03-20	—	80	0	60	4.4	6.3	—	4.1	—	14	17	—	—	—	—	—	—	—	—	170	—	—	—
850	Ss	76-06-02	24	40	0	1.5	.7	2.6	—	.9	15	.6	.9	.1	.47	.00	.01	.00	.03	37	41	7	0	50	5.9
860	Ss	76-11-16	45	20	10	13	5.4	7.8	—	.9	81	2.9	1.4	.1	.34	.00	.05	.00	.07	100	120	55	0	140	6.4
918	Ss	76-11-17	20	20	0	40	3.3	5.3	—	.6	137	.4	2.7	.1	.07	.00	.00	.00	.09	133	141	110	1	220	6.6
935	Lscg	76-11-16	16	190	0	42	4.8	3.3	—	1.0	148	2.6	4.7	.1	2.1	.00	.00	.03	.03	160	158	120	3	202	5.6
958	Ss	76-11-16	27	30	0	15	8.0	8.8	—	.7	42	35	7.1	.1	4.3	.01	.01	.07	.04	134	142	71	36	202	5.6
985	Ss	76-11-16	34	0	0	42	14	9.6	—	1.3	181	16	5.9	.1	2.6	.01	.00	.00	.02	222	224	160	14	330	6.9
1023	Ss	76-11-16	19	10	0	38	3.0	3.6	—	.6	120	1.5	6.5	.1	2.3	.01	.00	.03	.06	138	142	110	9	230	6.3
1049[b]	—	78-06-21	1.5	1	390	870	140	8000	—	50	82	4800	9800	.4	.02	.01	1.9	.40	.01	23600	23800	2800	2600	33000	10.3

[a] Includes a small quantity of carbonate reported as bicarbonate.
[b] Saline water from a depth of 3,100 feet.

Table 14. *Median Concentrations of Chemical Constituents in Groundwater*

Constituent	Median of indicated constituent, in milligrams per liter, except as indicated							
	Diabase	Shale	Sandstone	Quartz conglomerate	Limestone conglomerate	Sandy shale in Middletown area	All sedimentary rocks	EPA limit[1]
Silica (SiO_2)	36	20	22	16	15	21	21	—
Iron (Fe) (μg/l)	110	80	40	90	145	70	70	300
Manganese (Mn) (μg/l)	10	0	0	10	15	10	0	50
Calcium (Ca)	38	56	25	8.6	50	87	42	—
Magnesium (Mg)	18	11	5.4	2.6	4.6	19	7.6	—
Sodium (Na)	7.9	8.6	7.8	3.2	5.4	12	8.8	—
Potassium (K)	1.3	1.3	.9	.8	1.7	1.5	1.1	—
Bicarbonate (HCO_3)	116	142	81	30	155	187	134	—
Sulfate (SO_4)	38	28	11	6.4	8.3	118	25	250
Chloride (Cl)	9.0	7.7	5.8	2.2	7.3	11	6.9	250
Fluoride (F)	.0	.1	.1	.1	.1	.0	.1	2
Nitrate (N)	2.1	3.2	2.6	.48	2.4	2.9	2.5	10
Nitrite (N)	.01	.01	.01	.01	.00	—	.01	—
Ammonia nitrogen (N)	.01	.01	.01	.00	.00	—	.01	—
Organic nitrogen (N)	.01	.00	.00	.01	.06	—	.00	—
Orthophosphorus (P)	.01	.02	.04	.04	.02	—	.03	—
Dissolved solids (residue at 180°C)	231	256	144	74	179	400	204	500
Dissolved solids (sum of constituents)	222	206	142	72	180	423	185	500
Hardness (Ca, Mg)	160	170	110	30	140	290	140	—
Noncarbonate hardness	44	40	9	5	15	130	32	—
Specific conductance (micromhos)	373	452	230	189	266	585	370	—
pH (units)	7.3	7.3	6.6	5.9	6.1	7.5	7.0	6.5–8.5
Number of analyses for each constituent	7–27	5–17	15–23	5–10	2	13–15	28–67	—

[1] Maximum allowable concentration as defined and recommended by the U.S. Environmental Protection Agency (1975, 1977).

Table 15. *Analyses of Trace Elements in Water from the Diabase*

Well number	Date of sample (yr-mo-day)	Dissolved aluminum (Al) (μg/l)	Dissolved arsenic (As) (μg/l)	Dissolved barium (Ba) (μg/l)	Dissolved boron (B) (μg/l)	Bromide (Br) (mg/l)	Dissolved cadmium (Cd) (μg/l)	Dissolved chromium (Cr) (μg/l)	Dissolved cobalt (Co) (μg/l)	Dissolved copper (Cu) (μg/l)	Dissolved lead (Pb) (μg/l)	Dissolved lithium (Li) (μg/l)	Dissolved mercury (Hg) (μg/l)	Dissolved nickel (Ni) (μg/l)	Dissolved selenium (Se) (μg/l)	Dissolved strontium (Sr) (μg/l)	Dissolved silver (Ag) (μg/l)	Dissolved zinc (Zn) (μg/l)
Ad- 377	76-11-17	20	0	0	0	0.0	0	20	0	10	3	0	<0.5	0	0	60	0	90
Be-1212	76-05-11	20	0	0	40	.0	1	<10	1	40	4	0	< .5	0	0	100	0	20
Ch-2321	75-04-01	20	0	0	0	—	2	0	1	30	2	0	< .5	1	0	—	0	1400
Da- 525	76-05-13	10	0	100	40	.1	0	10	0	10	2	0	< .5	0	0	70	0	560
Ln-1324	76-05-12	80	0	0	0	.0	1	<10	1	20	15	0	< .5	0	0	80	0	190
Yo-1015	76-11-16	20	0	0	0	.0	1	<10	3	30	7	0	< .5	2	0	50	6	110
Median		20	0	0	0	.0	1	<10	1	25	4	0	< .5	0	0	70	0	150
E.P.A. limit[1]		—	50	1000	—	—	10	50	—	1000	50	—	2	—	10	—	50	5000

[1]Maximum allowable concentration as defined and recommended by the U.S. Environmental Protection Agency (1975, 1977).

Table 16. *Analyses of Trace Elements in Water from the Gettysburg and Hammer Creek Formations*

Lithology: Lscg, limestone conglomerate; Qzcg, quartz conglomerate; Sh, shale; Ss, sandstone.

Well number	Lithology	Date of sample (yr-mo-day)	Dissolved aluminum (Al) (µg/l)	Dissolved arsenic (As) (µg/l)	Dissolved barium (Ba) (µg/l)	Dissolved boron (B) (µg/l)	Bromide (Br) (mg/l)	Dissolved cadmium (Cd) (µg/l)	Dissolved chromium (Cr) (µg/l)	Dissolved cobalt (Co) (µg/l)	Dissolved copper (Cu) (µg/l)	Dissolved lead (Pb) (µg/l)	Dissolved lithium (Li) (µg/l)	Dissolved mercury (Hg) (µg/l)	Dissolved nickel (Ni) (µg/l)	Dissolved selenium (Se) (µg/l)	Dissolved strontium (Sr) (µg/l)	Dissolved silver (Ag) (µg/l)	Dissolved zinc (Zn) (µg/l)
Ad- 164	Qzcg	76-11-18	30	1	0	0	0.0	1	<10	0	70	—	0	<0.5	0	0	60	2	20
346	Lscg	76-11-17	20	0	0	10	.0	1	<10	0	10	4	0	< .5	0	0	120	0	10
355	Sh	76-11-17	0	1	300	20	.0	1	<10	0	20	7	10	< .5	1	0	190	0	240
367	Ss	76-11-18	10	2	0	10	.1	1	<10	0	30	12	20	< .5	0	0	290	0	2200
369	Ss	76-11-18	10	0	200	10	.1	1	<10	0	10	5	10	< .5	0	0	310	2	20
Be- 1210	Qzcg	76-05-10	10	0	100	10	.0	1	<10	1	50	9	0	< .5	1	0	50	0	60
1211	Sh	76-05-10	10	0	100	0	.0	1	<10	1	140	12	0	< .5	4	0	170	0	470
1213	Ss	76-05-11	140	0	300	0	.1	1	<10	9	170	8	0	< .5	28	0	90	0	100
Ch- 1496	Qzcg	76-05-10	10	1	100	0	.0	0	<10	1	90	5	0	< .5	5	0	40	0	30
1528	Qzcg	74-10-31	10	2	100	10	—	0	0	0	10	3	10	< .5	2	1	—	0	500
1547	Sh	74-10-30	10	3	300	0	—	0	10	0	50	1	10	< .5	2	1	—	0	60
1568	Ss	76-05-10	0	2	0	0	0	1	<10	0	20	2	20	< .5	0	0	150	0	10
2240	Qzcg	76-05-10	10	0	0	0	.0	0	<10	2	80	5	0	< .5	7	0	60	0	20
Da- 510	Ss	76-05-13	10	0	0	10	.0	0	<10	1	150	5	0	< .5	0	2	100	0	1400
526	Ss	76-05-13	10	0	300	50	.1	1	10	0	40	5	20	< .5	0	0	580	0	40
Ln- 1313	Sh	76-06-02	10	0	0	260	.1	1	<10	2	40	3	10	< .5	0	0	900	0	140
1323	Sh	76-05-11	10	0	0	10	.0	1	10	1	30	8	0	< .5	2	0	70	0	3300
1325	Ss	76-06-02	60	0	0	10	.0	1	<10	1	160	14	0	< .5	10	0	50	0	690
Lb- 795	Qzcg	76-06-02	10	0	0	0	.1	1	10	0	60	5	0	< .5	0	0	70	0	40
798	Ss	76-05-13	10	1	0	10	.0	0	10	0	0	2	0	< .5	0	0	120	0	10
Yo- 850	Ss	76-06-02	10	0	0	0	.1	1	<10	1	30	4	0	< .5	0	0	30	0	10
860	Ss	76-11-16	10	2	0	40	.0	1	<10	0	10	4	0	< .5	0	0	30	0	1900
918	Ss	76-11-17	0	2	100	10	.0	1	<10	0	10	4	0	< .5	0	0	70	0	30
935	Lscg	76-11-16	0	0	100	10	.0	1	<10	1	150	71	0	< .5	2	0	80	0	540
958	Ss	76-11-16	30	1	100	20	.0	1	<10	0	150	11	0	< .5	0	0	60	0	80
985	Ss	76-11-16	0	2	100	60	.1	1	<10	0	10	5	30	< .5	0	0	120	0	10
1023	Ss	76-11-16	20	1	100	10	.1	0	<10	0	30	5	0	< .5	0	0	70	0	30
1049[1]	—	78-06-21	70	2	500	2700	.0	0	6	0	10	<15	3300	< .5	11	0	9800	0	130
MEDIAN			10	0	100	10	.0	1	<10	0	40	5	0	< .5	0	0	80	0	60
E.P.A. LIMIT[2]			—	50	1000	—	—	10	50	—	1000	50	—	2	—	10	—	50	5000

[1] Saline water from a depth of 3,100 feet. Not included in medians.

[2] Maximum allowable concentration as defined and recommended by the U. S. Environmental Protection Agency (1975, 1977).

tions, as defined and recommended by the U. S. Environmental Protection Agency (1975). The higher lead concentrations were generally in samples having a pH of less than 6.0 and a copper concentration higher than the median. In the six samples having the highest concentrations of copper (140-170 μg/l [micrograms per liter]), zinc exceeded the median of 60 μg/l, although high zinc concentrations also occurred in some samples having low copper concentrations. The above lead-copper-zinc relations suggest that much of the lead and copper and some of the zinc that was detected was dissolved from the plumbing, both in the well and aboveground. If this is so, the amount of lead being ingested by domestic users is higher than necessary. Lead concentrations may be reduced by using more plastic in the cold-water system and by water treatment.

Lithology has little influence on trace-element concentrations. However, the pH of the water in the sandstone and conglomerate is low, and water from these rocks is likely to dissolve plumbing. Median concentrations of trace elements are nearly the same for the diabase as for the Gettysburg and Hammer Creek Formations. Of the 17 trace elements measured, only strontium concentration generally increases as dissolved-solids concentration increases.

The large range in zinc concentrations (10–3,300 μg/l) is typical of groundwater in other areas of Pennsylvania (McGreevy and Sloto, 1976, p. 127; Wood and others, 1972, p. 88-95).

A map of water hardness is presented on Plate 2. The hardness data were collected over a substantial period of time, and no corrections were made for seasonal differences and other temporal changes, but the map does illustrate general patterns of water hardness. As water from the shale is generally much harder than that from the sandstone and conglomerate, a clear distinction can usually be made on the hardness map between areas underlain by sandstone and conglomerate and areas underlain by shale. However, within each area, the effects of residence time, topography, land use, and other factors may produce anomalies.

Generally, water from the Hammer Creek Formation is soft. However, several areas of hard water occur along the north border of the Triassic basin in Lebanon County. Fragments of carbonate rock derived from the limestone and dolomite to the north are present in the Hammer Creek Formation there and provide a highly soluble source of calcium and magnesium carbonate.

Calcium:magnesium ratios clearly illustrate the influence of lithology on groundwater quality. The median calcium:magnesium ratio for water from the diabase is 1.3:1, whereas for water from the Gettysburg and Hammer Creek Formations it is 3.4:1. Silica concentration is also much different for the diabase. Water from only five of 66 wells in the Gettysburg and Hammer Creek Formations had a silica concentration of more than 30 mg/l, but the median concentration in water from the diabase was 36 mg/l.

Water temperature in 43 drilled wells in the Gettysburg and Hammer Creek Formations ranged from 9°C to 15°C; the median was 12.5°C, about the same as the average annual air temperature (12°C). Water temperatures in 19 drilled wells in the diabase ranged from 10°C to 15°C, and the median was 12°C. Seasonal variations in temperature were generally less than 2°C in water from drilled wells.

WATER-QUALITY PROBLEMS

Although the water generally has good quality, maximum allowable concentrations, as defined and recommended by the U. S. Environmental Protection Agency (1975, 1977), were exceeded in some wells and springs. Iron exceeded 300 μg/l in water from nine of 66 wells and springs in the Gettysburg and Hammer Creek Formations and from three of 25 wells and springs in the diabase. Manganese exceeded 50 μg/l in water from five of 58 wells and springs in the Gettysburg and Hammer Creek Formations and from four of 22 wells in the diabase.

Chloride exceeded 250 mg/l in two wells of the 25 wells and springs sampled in the diabase. Both wells (Yo-834 and Yo-835) are near a salt pile. The high conductances measured in water from wells Ln-1311 and Ln-1312 at the Pennsylvania Turnpike maintenance areas suggest that the high concentrations of chloride in the groundwater at these sites may be from leaching of salt piles. Kraybill (written communication, 1973) reported that three wells in diabase, on the southwest side of U. S. Route 230 in Londonderry Township, Dauphin County, had chloride concentrations in excess of 500 mg/l during 1971 to 1973.

Sulfate exceeded 250 mg/l at one spring and three wells of the 67 sites sampled in the Gettysburg and Hammer Creek Formations. All three wells are at the Harrisburg International Airport. Calcium, potassium, and sulfate concentrations in several wells at the airport increased sharply during the late 1950's and early 1960's. Concentrations at the individual wells reached a maximum between 1961 and 1963 and then declined generally through the end of the period of annual sampling, in 1967.

Meisler and Longwill (1961, p. H32-H33) explained the high sulfate concentration in water from some wells at the airport as follows:

> Ground water in the main part of Olmsted Air Force Base appears to be a mixture of two chemical types: (a) the calcium bicarbonate type, as exemplified by water from the central area and by the early analyses of water from the western area, and (b) the calcium sulfate type, as exemplified by water from the eastern area and by the 1958 analyses from the western area. Water from a newly pumped or little-pumped area falls within the calcium bicarbonate type and is low in dissolved solids. As heavy pumping continues, the water changes to the calcium sulfate type and becomes harder, and the dissolved solids increase. The first type probably represents water that is being recharged by precipitation at the outcrop area under the alluvium. The second type represents water that has been in storage in the aquifer, probably downdip from the pumped well.

Although this explanation may be correct, some of the increase in concentration may have been caused by leaching of relatively soluble constituents from blast-furnace slag that was used for fill when the runway was extended during 1958-61.

Occasional high sulfate concentrations occur naturally in water from rocks of Triassic age in Pennsylvania. In addition to the wells sampled during this investigation, two wells in the Hammer Creek Formation were reported to yield water high in sulfate. Water from the first of these wells (Be–516) had a sulfate concentration of 259 mg/l. The second (Ln–1310) was extensively studied by Moody and Associates, Inc. (written communication, 1974). After the well had been pumped for 5 hours at about 250 gpm, the sulfate concentration was 330 mg/l; after 2 hours of additional pumping, the sulfate concentration was 390 mg/l. The pump was turned off, and the water level was allowed to recover. A packer was then installed in the well 223 feet below land surface, and the well was retested. The sulfate concentration was 200 mg/l after 5 hours of pumping at about 250 gpm, indicating that much of the high-sulfate water was coming from the deeper yielding zones. Nearly half of the yield of this well was obtained from zones more than 223 feet below land surface. Water samples collected during drilling indicate that sulfate concentrations from the deeper part of the well exceed 600 mg/l.

The high sulfate concentrations are probably produced by solution of naturally occurring sulfate minerals and from oxidation of sulfide minerals, principally pyrite. High sulfate concentrations generally occur only in water from areas underlain by shale and are most frequently encountered near diabase dikes. The sulfate does not seem to come from the diabase—the highest sulfate concentration in water from 27 wells and springs in the diabase was only 64 mg/l—or from alteration of the shale, but is probably due to the increased time the water is in contact with the rocks. The diabase acts as a barrier, impeding the flow of the groundwater and thus increasing residence time. High sulfate concentration is rarely observed in wells less than 300 feet deep.

Bain (1972, p. 88) plotted available sulfate data for wells deeper than 400 feet in eastern Pennsylvania. He observed that:

> The resulting sulfate distribution map clearly shows a good relationship of highest sulfate in proximity to major streams. In the past, high sulfate content in ground water near streams in this area has been attributed to industrial pollution. It is just as plausible to expect sulfate content to be greatest along the ground-water discharge zones.

This infers that sulfate concentration is proportional to contact time. Near discharge points almost all groundwater flow is at shallow depths. Thus, less sulfate has been dissolved from the deeper yielding zones near discharge points, and the slow moving water in the deeper zones has had a long time to dissolve the substantial amounts of sulfate minerals that remain in the rocks.

Few data are available on the quality of water from wells deeper than 1,000 feet. Bain (1972, p. 100) reviewed the available data and concluded that, "The depth of potable water (less than 1,000 mg/l total dissolved solids) appears to lie between 1,000 and 2,000 feet." Well Yo-1049 is reported to have encountered fresh water at about 2,300 feet below land surface. A sample was collected by bailer from the interval between 2,990 and 3,184 feet below land surface. It had 23,600 mg/l of dissolved solids, 8,000 mg/l of sodium, 870 mg/l of calcium, 9,800 mg/l of chloride, and 4,800 mg/l of sulfate. Apparently, this sample represents the upper part of the brine system, which has been diluted by fresh water and has dissolved gypsum and possibly other sulfate minerals from the Gettysburg Formation.

Water in the diabase is commonly of poor quality. Nitrate exceeded 10 mg/l in four of the 26 wells and springs sampled. One well (Ad-376) that was not sampled appeared, on the basis of odor and color, to be pumping water highly polluted with septic-tank effluent. Also, water from a few wells in the diabase is reported to become cloudy during or after periods of rain. These problems all seem to be the result of a very shallow circulation system in the aquifer. Developments having high population density and on-site water and sewage will probably pollute the groundwater in areas underlain by diabase.

Dissolved-solids concentration exceeded 500 mg/l in water from five of 65 wells and springs in the Gettysburg and Hammer Creek Formations and from two of 27 wells and springs in the diabase. However, all but one of these seven sites has received contaminants.

Groundwater from areas underlain by quartz conglomerate and sandstone generally has a pH lower than 7.0. The median pH (Table 14) for water from sandstone is 6.6 and from quartz conglomerate is 5.9. These low-pH waters are commonly corrosive and tend to dissolve copper plumbing. This is especially true where the water is very soft (hardness less than about 40 mg/l).

Many of these soft groundwaters contain heavy metals (chiefly copper, lead, and zinc) that obscure the end point of the most common field method of determining hardness (titration with disodium dihydrogen ethylenediamine tetracetate using Eriochrome Black T as an indicator). Thus, many erroneously high determinations of hardness have been made, and many water softeners have been installed on wells that yield very soft water and actually needed a neutralizer or chemical feeder. Interferences seem to be most common in eastern Lancaster County, but do occur in other counties.

Several widely scattered wells (Ad-319, Da-89, Da-92, Da-96, Da-564, Lb-854, an abandoned well near Ln-1311, and Yo-919) have been polluted by petroleum products. The lighter petroleum fractions (especially gasoline) impart objectionable tastes to water; thus, the utility of groundwater is seriously impaired where petroleum products are present. The petroleum prod-

ucts detected in this study have come from leaky storage tanks, broken pipelines, and accidental spills. Once in the ground, petroleum products generally remain for long periods of time. However, the Agnes Flood (1972) apparently flushed petroleum products from the ground in the inundated area at the Harrisburg International Airport. No trace of petroleum products was detected in Da–92 after the flood.

SUMMARY

Well yields from the Gettysburg and Hammer Creek Formations are generally adequate for domestic use, and, except in a few areas of caving sandstone, casing depths and well depths are not great. Supplies adequate for small towns and industries can be developed over most of the area underlain by these formations.

The chemical quality of the water is generally good. Maximum allowable concentrations of dissolved constituents, as defined and recommended by the U. S. Environmental Protection Agency (1975, 1977), are exceeded in only a few wells. Water from the shale is generally hard, but water from the sandstone and conglomerate is soft. Wells high in turbidity are rare, and pollution is not as prevalent as in many other formations.

Water usage from these formations in 1976 was low, only 6 Mgal/d. Possibly as much as 144 Mgal/d could be developed over the entire area. However, use of this much water would impact heavily on streamflow; in some places the water table would be lowered below the bed of a stream, so that it would cease to flow except in response to storms. Many wells obtain a substantial part of their yield from induced recharge to the aquifer from nearby streams. As a result, small streams that were formerly perennial will dry up near heavily pumped wells.

The areas that had the largest increases in groundwater use over the past decade—Gettysburg, Reamstown, and Middletown-Harrisburg International Airport-Highspire—have above average well yields. Therefore, enough new supplies of groundwater can be developed in these areas to meet the demands anticipated for the next 20 to 30 years. However, most new wells will have to be located 1 to 3 miles from urbanized areas to avoid interference with old wells.

The communities on or near the contact between the Gettysburg and New Oxford Formations—Bonneauville and New Berlin—will have the greatest difficulty in developing adequate groundwater supplies. Wells about a mile north of the contact may have the best chance of supplying enough water to these communities.

The diabase is one of the poorest aquifers in the state and usually yields barely enough water to wells for a domestic supply. About 10 percent of the wells fail to yield even an adequate domestic supply. Furthermore, as wells

in diabase obtain their water from fractures near the land surface, they are particularly subject to pollution from on-lot sewage systems. Where the diabase is not too thick, moderate- to even high-yielding wells may be obtained by drilling through the diabase into the underlying sedimentary rocks.

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TABLE 17. RECORD OF WELLS

Well location: The number that is assigned to identify the well. It is prefixed by a two-letter abbreviation of the county. The lat-long is the coordinates in degrees and minutes of the southeast corner of a 1-minute quadrangle within which the well is located.

Use: A, air conditioning; B, bottling; C, commercial; H, domestic; I, irrigation; N, industrial; O, observation; P, public supply; R, recreation; S, stock; T, institution; U, unused.

Topographic setting: H, hilltop; S, hillside; V, valley.

Aquifer: Trg, Gettysburg Formation; Trhc, Hammer Creek Formation; Trd, Triassic diabase; Oe, Epler Formation (the two wells completed in this formation were drilled through several hundred feet of Gettysburg Formation).

Lithology: db, diabase; lscg, limestone conglomerate; qzcg, quartz conglomerate; sh, shale; shss, shale and sandstone; ss, sandstone.

Static water level: Depth--F, flowing, +, above land surface; date--month/last two digits of year.

Reported yield: gpm, gallons per minute.

Specific capacity: gpm/ft, gallons per minute per foot of drawdown.

Hardness: gpg, grains per gallon.

Specific conductance: Deg C, degrees Celsius.

Table 17.

Well location								
Number	Lat-Long	Owner	Oriller	Oate completed	Use	Alti-tude of land surface (feet)	Topo-graphic setting	Aquifer/ lithology
								AOAMS
Ad- 28	3944-7710	Hoffmans Orphanage	---	1915	T	572	S	Trg/sh
61	3948-7708	E. E. Hartlaub	Harrisburg's Kohl Bros.	1960	H	597	V	Trg/ss
62	3948-7708	Bernard Claybough	C. G. Fair, Jr.	1951	H	600	H	Trg/ss
127	3954-7702	Luther Myers	Harrisburg's Kohl Bros.	1956	H	533	S	Trg/sh
128	3954-7702	do.	---	---	---	534	S	Trg/sh
136	3956-7659	East Berlin Bor.	Harrisburg's Kohl Bros.	1927	U	529	S	Trg/sh
137	3956-7659	do.	do.	1927	P	527	S	Trg/sh
139	3956-7659	Melvin Meyers	Robert 5. Toomey & Sons	1953	H	530	H	Trg/sh
140	3956-7659	do.	---	1928	S	530	H	Trg/sh
141	3956-7659	do.	---	1927	U	527	H	Trg/sh
142	3956-7659	M. L. 8oyer	---	---	U	460	S	Trg/sh
143	3956-7659	do.	---	1927	H	460	S	Trg/sh
145	3956-7659	Paul Anthony	---	1928	H	510	H	Trg/sh
146	3958-7704	U. 5. Geol. Survey	Eichelberger Well Orilling	1967	U	540	V	Trg/ss
147	4049-7713	Gettysburg 8or.	---	1882	U	605	S	Trd/db
148	4049-7713	do.	O. E. Miller	1883	U	607	H	Trd/db
153	3955-7718	Arendtsville 8or.	Harrisburg's Kohl 8ros.	1941	P	760	S	Trg/sh
154	3955-7718	do.	do.	1956	P	750	S	Trg/sh
155	4000-7707	York Springs Bor.	---	---	P	735	S	Trg/qzcg
156	4000-7707	do.	Harrisburg's Kohl Bros.	1955	P	735	5	Trg/qzcg
157	4000-7706	do.	do.	---	P	615	S	Trg/sh
159	3959-7713	Aspers Water Co.	do.	1954	P	660	V	Trg/qzcg
162	3956-7715	Biglerville Water Co.	---	1913	U	830	S	Trg/qzcg
163	3956-7715	do.	---	1913	U	795	V	Trg/qzcg
164	3956-7715	do.	---	---	P	800	S	Trg/qzcg
165	3955-7715	do.	Harrisburg's Kohl Bros.	1950	P	665	V	Trg/sh
166	3955-7715	do.	do.	1960	P	685	V	Trg/sh
170	3947-7716	Gettysburg Munic. Auth.	do.	1930	P	465	V	Trg/sh
172	3947-7722	Gettysburg Shoe Co.	---	---	U	605	V	Trg/lscg
173	3949-7714	Gettysburg Munic. Auth.	---	---	U	580	S	Trg/sh
174	3949-7714	do.	Kohl Bros., Inc.	1966	P	560	S	Trg/sh
175	3948-7714	U. 5. Park Service	---	---	U	605	V	Trd/db
176	3947-7714	do.	---	---	U	470	V	Trd/db
177	3949-7714	do.	---	---	U	550	V	Trg/sh
227	3951-7717	Benjamin Binder	---	---	U	585	S	Trd/db
231	3951-7717	do.	---	---	U	585	S	Trd/db
236	3951-7708	Frank Beshore	---	---	H	595	V	Trd/db
237	3951-7708	Gulden Cigar Factory	---	---	N	570	V	Trg/sh
238	3946-7709	Two Taverns	---	---	H	520	S	Trg/sh
239	3947-7711	Mr. Benner	---	---	H	520	S	Trg/sh
240	3947-7711	do.	---	---	H	500	S	Trg/sh
241	3949-7714	George Olinger	---	---	U	520	V	Trg/sh
242	3949-7714	do.	---	---	U	520	V	Trg/sh
243	3949-7714	Lutheran Seminary	---	---	U	560	H	Trg/sh
244	3950-7715	Arthur Shields	---	---	H	574	S	Trg/sh
245	3950-7715	Millers Camp	---	---	H	575	V	Trg/sh
246	3950-7716	do.	---	---	H	570	V	Trg/sh
247	3950-7716	do.	---	---	H	555	V	Trg/sh
248	3950-7716	Mr. Eck	---	---	H	550	H	Trg/sh
249	3951-7717	do.	---	---	H	545	V	Trg/sh
250	3951-7717	L. E. Hershey	---	---	H	560	V	Trd/db
252	3948-7716	Gettysburg Munic. Auth.	Harrisburg's Kohl 8ros.	1970	P	500	H	Trg/sh
253	3949-7713	Gettysburg Bor.	Kohl 8ros., Inc.	1969	U	490	S	Trg/sh
254	3949-7715	Pa. Oept. of Trans.	---	1939	U	530	H	Trg/sh
255	3947-7716	U. S. Oept. of Interior	Eichelberger Well Orilling	1968	U	470	S	Trg/sh
256	3947-7716	Gettysburg Munic. Auth.	Kohl Bros., Inc.	1970	U	495	H	Trg/sh
257	3951-7714	Westinghouse Elevator Co.	Weldo W. Funt	---	I	530	5	Trg/sh
261	3948-7711	Lake Heritage Utilities, Inc.	Moody Orilling Co., Inc.	1965	P	500	S	Trg/sh
262	3948-7711	do.	do.	1965	P	500	S	Trg/sh
263	3958-7702	Lake Meade Utilities, Inc.	York Orilling Co., Inc.	1967	P	510	V	Trg/sh
264	3958-7702	do.	do.	1967	P	510	V	Trg/sh
265	3945-7723	Charnita Water & Improvement	Austin R. Keyser, Inc.	1966	P	583	5	Trg/lscg
267	3948-7708	Bonneauville Bor.	York Orilling Co., Inc.	1972	U	585	V	Trg/ss
268	3948-7708	do.	Harrisburg's Kohl Bros.	1974	P	535	V	Trg/ss
269	3948-7708	do.	do.	1975	U	520	V	Trg/ss

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
COUNTY											
160	---	6	---	40	---	---	---	---	---	---	Ad- 28
86	---	6	---	5	11/60	---	---	---	---	---	61
97	---	6	---	10	10/51	---	---	12	540	7.4	62
135	---	6	---	30	2/56	---	---	---	---	---	127
100	---	---	---	---	---	---	---	---	---	---	128
900	---	8	---	58	10/57	28	.08	11	535	---	136
256	---	8	---	50	1927	45	.65	11	495	---	137
120	---	6	---	---	---	7	---	---	---	---	139
144	---	6	---	---	---	---	---	14	710	---	140
55	---	48	---	12	10/60	---	---	---	---	---	141
28	---	48	---	18	10/60	---	---	---	---	---	142
74	---	6	---	---	---	---	---	7	380	---	143
200	---	6	---	---	---	---	---	---	---	---	145
100	---	6	---	13	---	13	---	11	400	---	146
100	---	12	---	50	---	---	---	---	---	---	147
100	---	12	---	30	---	25	.39	5	---	6.6	148
115	60	6	---	4	1941	80	1.5	---	---	---	153
125	73	6	---	10	2/56	97	1.1	4	---	6.2	154
104	44	6	---	---	---	30	---	4	---	7.0	155
90	49	6	---	65	3/55	30	---	5	---	6.7	156
200	---	8	---	F	3/64	150	.91	5	185	5.9	157
500	34	6	---	9	2/54	21	.12	6	---	6.6	159
80	---	6	---	---	---	10	---	---	---	---	162
210	---	10	---	F	6/76	8	---	---	---	---	163
230	---	6	---	---	---	20	---	5	175	6.5	164
250	19	6	---	30	11/50	20	.12	5	---	8.2	165
250	41	6	80;230	15	6/60	68	.80	6	---	7.6	166
550	---	12	---	3	7/54	630	3.3	57	---	7.3	170
71	---	6	---	7	11/67	---	---	---	---	---	172
348	---	---	---	52	3/63	185	1.4	7	---	7.0	173
500	47	8	180;200;220; 397	50	10/66	183	1.2	8	450	7.7	174
26	9	48	---	14	11/67	---	---	---	---	---	175
8	---	48	---	3	11/67	---	---	---	---	---	176
499	32	8	---	59	9/68	180	1.2	9	---	7.8	177
196	---	6	---	7	4/68	---	---	---	---	---	227
15	---	36	---	8	5/68	---	---	---	---	---	231
40	---	---	---	---	---	---	---	---	---	---	236
125	---	6	---	---	---	6	---	---	---	---	237
90	---	6	---	---	---	4	---	---	---	---	238
125	---	6	---	---	---	7	---	---	---	---	239
155	---	6	---	---	---	2	---	---	---	---	240
400	---	8	---	30	---	200	3.0	16	---	7.5	241
232	---	6	---	---	---	---	---	---	---	---	242
125	---	6	---	---	---	7	---	---	---	---	243
80	---	6	---	---	---	5	---	---	---	---	244
40	---	6	---	---	---	3	---	---	---	---	245
55	---	6	---	---	---	4	---	---	---	---	246
60	---	6	---	---	---	5	---	---	---	---	247
60	---	6	---	---	---	5	---	---	---	---	248
60	---	6	---	---	---	2	---	---	---	---	249
36	---	6	---	---	---	4	---	---	---	---	250
500	53	8	80;120;320	2	2/70	290	1.0	11	750	7.9	252
605	43	10	105;195;315; 350;385;490	15	4/69	30	.12	---	---	---	253
500	---	6	---	15	8/76	50	.12	---	---	---	254
475	14	10	5;90;160;235; 260;284;327; 346;385	3	4/69	383	2.7	10	---	7.5	255
423	31	10	91;139;290; 360;400	22	10/70	154	1.5	23	---	7.8	256
---	---	6	---	10	6/76	35	.49	14	560	---	257
346	32	6	---	24	7/65	125	1.7	---	---	7.8	261
388	32	6	---	24	7/65	125	2.8	9	---	7.4	262
240	15	8	---	4	4/67	112	.94	8	---	7.0	263
220	16	8	---	1	5/67	121	1.1	9	---	7.0	264
85	63	6	68;85	31	6/66	85	10	---	---	---	265
250	43	6	---	---	---	8	.04	---	---	---	267
400	40	6	325	F	2/74	39	.20	9	---	7.8	268
500	41	6	15;42;280;316; 395	0	10/75	18	.05	5	280	7.9	269

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Ad- 270	3948-7716	Gettysburg Munic. Auth.	Eichelberger Well Drilling	1976	P	475	V	Trg/sh
271	3955-7714	Kennies Food Market	John S. Funt	1975	C	620	V	Trg/sh
272	3950-7713	Columbia Gas of Pa., Inc.	---	---	U	515	S	Trg/sh
273	3950-7713	Graybills, Inc.	John S. Funt	1965	C	505	V	Trg/sh
274	3951-7714	Gettysburg Area Sch. Dist.	Harrisburg's Kohl Bros.	1960	U	522	H	Trg/sh
275	3952-7716	R. M. Shealer	Daniel L. Ryan	1975	H	660	H	Trd/db
276	3955-7714	Inland Container Corp.	Harrisburg's Kohl Bros.	1947	U	650	V	Trg/sh
277	3955-7714	Biglerville Bor. Auth.	do.	1961	C	595	V	Trg/sh
278	3955-7714	Pet Inc.	do.	1946	N	645	V	Trg/sh
279	3955-7714	do.	do.	1945	U	600	V	Trg/sh
280	4002-7707	do.	do.	1944	U	660	S	Trd/db
281	3955-7714	do.	do.	1941	N	625	V	Trg/sh
282	3955-7714	do.	do.	1936	N	640	V	Trg/sh
283	3955-7714	do.	do.	1937	N	630	V	Trg/sh
284	3955-7715	do.	do.	1945	N	660	V	Trg/sh
285	3955-7715	do.	do.	1946	N	655	V	Trg/sh
286	3955-7715	do.	do.	1947	N	660	V	Trg/qzcg
287	3955-7715	do.	do.	1947	N	685	V	Trg/qzcg
288	3955-7715	do.	do.	1950	N	680	V	Trg/qzcg
289	3955-7714	do.	John Thran	1974	U	615	V	Trg/sh
290	3948-7708	Bonneauville Bor.	Harrisburg's Kohl Bros.	1976	U	550	V	Trg/ss
291	3952-7717	R. M. Welty	do.	1974	H	605	V	Trg/sh
292	3953-7715	Charles Fagnan	John S. Funt	1972	H	680	H	Trg/sh
293	3955-7718	Arendtsville Bor.	Harrisburg's Kohl Bros.	1956	U	895	S	Trg/qzcg
294	3954-7716	Gerald Orner	John S. Funt	1972	H	660	V	Trg/sh
295	3958-7713	Duffy-Mott Co., Inc.	Harrisburg's Kohl Bros.	1943	N	660	S	Trg/sh
296	3958-7713	do.	do.	1951	N	665	V	Trg/qzcg
297	3958-7713	do.	do.	1941	N	645	S	Trg/sh
298	3958-7713	do.	do.	1966	N	655	S	Trg/ss
299	3958-7713	do.	Eichelberger Well Drilling	1975	N	630	S	Trg/sh
300	3958-7713	Mountain Orchard Coop., Inc.	Harrisburg's Kohl Bros.	1937	N	640	S	Trg/sh
301	3958-7713	do.	Eichelberger Well Drilling	1963	N	620	V	Trg/sh
302	3951-7714	H. J. Keller Co.	John S. Funt	1974	N	500	V	Trg/sh
303	3951-7714	do.	do.	1974	N	505	V	Trg/sh
304	3945-7716	Gettysburg Foundry Specialties	Denis H. Woodward	1975	N	518	H	Trd/db
305	3945-7716	do.	---	1969	N	500	S	Trd/db
306	3946-7715	Joseph Eyler	Harrisburg's Kohl Bros.	1973	H	545	H	Trg/ss
307	3944-7715	U. S. Farm Home Admin.	do.	1973	H	480	S	Trg/ss
308	3944-7718	Rooney	Cline & Duvall, Inc.	1973	H	550	S	Trd/db
309	3944-7719	Charles Keyes	do.	1974	H	530	H	Trg/sh
310	3944-7717	F. B. Darcey	do.	1973	H	480	V	Trd/db
311	3959-7710	Gervus Currens	Eichelberger Well Drilling	1976	H	760	S	Trg/qzcg
312	4000-7707	York Springs Bor.	Harrisburg's Kohl Bros.	1948	U	720	S	Trg/qzcg
313	4000-7607	do.	do.	1947	U	720	S	Trg/qzcg
314	3958-7713	Barry Showers	Frank Wilson, Jr.	1973	H	650	H	Trd/db
315	3956-7713	Clair Althoff	John S. Funt	1973	H	630	S	Trg/sh
316	3953-7714	Glenn Wolford	Weldo W. Funt	1974	H	680	H	Trg/sh
317	3953-7713	George Hagan	do.	1973	H	620	S	Trg/sh
318	3955-7712	John Bowmaster	John S. Funt	1973	H	550	V	Trg/sh
319	3953-7711	Robert Cleveland	Weldo W. Funt	1973	P	560	H	Trg/ss
320	3952-7709	M. B. Horn	John S. Funt	1974	H	560	V	Trg/sh
321	3952-7709	Kenneth Sheaffer	do.	1974	H	580	S	Trg/sh
322	3955-7707	Karl Stell	William W. Reichart	1971	H	540	V	Trg/sh
323	3951-7708	R. E. Thompson	Weldo W. Funt	1973	H	620	V	Trd/db
324	3951-7707	Albert Schulteis	do.	1973	H	565	V	Trd/db
325	3951-7707	Robert Glass	do.	1973	H	560	V	Trd/db
326	3951-7707	Richard Miller	do.	1972	S	560	V	Trg/sh
328	3948-7709	Gary Crone	do.	1975	U	525	S	Trg/sh
329	3948-7709	Richard Weaver	do.	1973	I	525	S	Trg/sh
330	3949-7711	O. P. Kuhn	do.	1973	H	545	S	Trg/sh
331	3949-7710	Harry Zimmerman	do.	1973	H	545	H	Trg/sh
332	3948-7711	Douglas Royston	---	1970	H	550	S	Trd/db
333	3948-7711	Anthony Shriner	Daniel L. Ryan	1975	H	545	S	Trg/sh
334	3947-7711	Robert Gantz	Weldo W. Funt	1972	H	505	H	Trg/sh
335	3947-7711	John Sanders	do.	1973	H	505	H	Trg/sh
336	3945-7711	Lyman Schwartz	John S. Funt	1973	H	525	H	Trg/sh
337	3947-7712	James Nett, Jr.	Weldo W. Funt	1973	H	440	S	Trg/sh
338	3946-7714	Thomas Dolly	do.	1975	C	510	H	Trg/ss
339	3946-7714	do.	do.	1974	H	520	H	Trg/sh
341	3947-7709	R. W. Kelly	do.	1973	H	582	H	Trg/sh
343	3950-7712	Holiday Inn	Harrisburg's Kohl Bros.	1973	U	500	V	Trg/ss
344	3950-7712	do.	do.	1973	U	500	V	Trg/ss

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
655	65	8	72;222;262; 330;513;562; 587;615	19	6/76	150	.55	12	490	---	Ad- 270
170	52	6	80;140	---	---	30	---	14	---	7.3	271
204	---	8	---	10	---	---	---	---	---	---	272
126	30	6	---	9	6/76	20	---	14	575	7.7	273
155	20	6	50;150	25	10/60	12	.24	---	---	---	274
42	36	6	34	11	5/75	6	.24	10	430	---	275
620	10	8	---	70	3/47	20	---	---	---	---	276
250	31	6	---	2	4/61	70	2.1	19	630	7.7	277
600	24	8	---	100	7/46	200	---	---	---	---	278
137	---	6	---	4	6/76	82	.71	9	---	6.5	279
265	32	6	---	11	3/44	14	.16	---	---	---	280
589	29	8	---	31	6/76	200	1.0	18	575	6.9	281
511	---	8	---	47	6/76	150	4.8	24	---	6.7	282
563	---	---	---	---	---	200	---	---	---	---	283
248	14	6	---	---	---	35	---	---	---	---	284
150	22	6	---	4	7/46	45	.36	---	---	---	285
205	14	6	---	7	4/47	25	.17	---	---	---	286
495	20	6	---	5	4/47	33	.26	---	---	---	287
203	38	6	---	10	5/50	40	2.0	---	---	---	288
60	---	6	---	10	---	---	---	27	350	6.4	289
504	44	8	55;124	8	6/76	8	.02	---	---	---	290
80	57	6	65;71	0	6/76	30	.43	17	550	---	291
70	20	6	---	---	---	8	---	12	450	---	292
500	---	6	---	---	---	1	.01	---	---	---	293
170	20	6	20;110	---	---	20	---	12	440	---	294
650	12	10	---	60	---	80	3.1	46	1300	---	295
550	31	6	---	4	5/51	65	.42	8	350	---	296
575	12	6	---	---	11/41	---	1.0	---	---	---	297
600	105	8	---	60	3/66	168	1.4	20	600	7.6	298
400	68	8	123;167;210	112	9/75	310	3.8	11	---	7.6	299
560	---	6	---	20	9/37	60	.86	---	---	---	300
360	60	6	---	5	9/63	114	2.2	14	450	---	301
240	---	6	---	---	---	60	---	16	580	---	302
280	---	6	---	14	7/76	60	---	---	---	---	303
750	10	6	---	8	7/76	1	.01	---	---	---	304
140	---	6	---	---	---	2	---	11	510	---	305
240	40	6	30;175	100	5/73	8	.06	---	---	---	306
130	40	6	80;120	55	5/73	15	.20	13	500	---	307
97	27	6	40;80	5	6/73	6	.06	5	200	---	308
120	24	6	40;70;115	1	7/74	20	.18	17	650	---	309
172	30	6	45;168	8	7/76	25	.15	12	435	---	310
250	209	6	232	---	---	30	---	---	---	---	311
345	---	6	---	---	---	10	---	---	---	---	312
230	63	6	---	---	---	10	---	---	---	---	313
118	40	6	---	80	7/73	12	---	9	305	---	314
120	36	6	108	14	7/76	35	---	11	405	---	315
90	34	6	52;78	14	6/74	12	.18	11	450	---	316
100	17	6	92	F	8/73	30	.97	15	505	---	317
145	20	6	110	---	---	12	---	---	---	---	318
90	43	6	78	8	1/73	30	1.2	6	295	---	319
80	21	6	45	---	---	6	---	---	---	---	320
170	30	6	100;160	---	---	6	---	---	410	---	321
163	10	6	45;92;154	35	---	8	---	---	---	---	322
63	50	6	53	9	7/76	12	.75	7	280	---	323
92	78	6	80	18	6/73	10	.18	9	420	---	324
105	20	6	92	23	6/73	4	.06	12	470	---	325
80	20	6	42;68	21	10/72	20	.95	11	380	---	326
91	21	6	68	20	4/75	10	.21	---	---	---	328
60	21	6	55	6	11/73	4	.08	---	---	---	329
122	42	6	60;110	---	---	4	---	8	350	---	330
110	24	6	70;102	18	7/73	10	.17	14	450	---	331
182	26	6	120	65	1/70	3	---	5	230	---	332
98	38	6	45	40	7/75	1	.01	---	---	---	333
190	20	6	125;180	75	10/72	5	.05	---	---	---	334
112	21	6	42;102	30	4/73	10	.24	---	---	---	335
220	24	6	210	16	7/76	12	---	9	355	---	336
120	21	6	70;110	22	9/73	10	.19	12	450	---	337
300	37	6	92;192;258	34	4/75	20	.11	12	400	---	338
166	37	6	92;156	34	5/74	20	.23	---	---	---	339
100	24	6	62;94	20	8/73	10	.16	12	430	---	341
420	57	8	100;200;260; 320	10	8/76	295	1.1	6	---	7.8	343
220	80	8	100;150;190	12	8/76	22	.12	11	---	7.6	344

Table 17.

Well location: Number	Well location: Lat-Long	Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Ad- 345	3944-7712	Bernard Wiles	Cline & Duvall, Inc.	1974	H	480	S	Trg/sh
346	3947-7722	Fairfield Munic. Auth.	A. C. Reider & Son, Inc.	1974	P	600	V	Trg/lscg
347	3947-7721	Carl Sturges	Weldo W. Funt	1974	H	595	V	Trg/lscg
348	3947-7721	do.	do.	1975	H	595	V	Trg/lscg
349	3949-7719	KOA Campground	Austin R. Keyser, Inc.	1974	C	650	V	Trg/sh
350	3949-7711	Drummer Boy Campground	---	---	C	565	S	Trd/db
351	3949-7715	T. F. Kotula, Jr.	Weldo W. Funt	1973	H	535	V	Trg/sh
352	3951-7714	Donald Bosserman	John S. Funt	1973	H	595	S	Trg/sh
353	3951-7718	Tom Norman	do.	1973	H	602	H	Trg/sh
354	3951-7720	Mrs. L. W. Sojka	do.	1973	H	585	V	Trg/sh
355	3951-7721	Harold Recker	do.	1972	H	675	S	Trg/sh
356	3951-7721	L. E. Weaver	Weldo W. Funt	1974	U	675	H	Trg/sh
357	3950-7722	Knouse Foods Inc.	Eichelberger Well Drilling	1963	N	670	V	Trg/lscg
358	3950-7721	do.	---	1945	N	635	S	Trg/sh
359	3947-7721	Terry Hartle	Weldo W. Funt	1973	H	640	H	Trg/lscg
360	3947-7719	J. S. Krafft	William W. Reichart	1975	H	722	S	Trg/sh
361	3953-7721	O. C. Kuhn	Weldo W. Funt	1972	H	820	S	Trg/qzcg
362	3953-7721	Reuben Kisner	John S. Funt	1972	H	780	S	Trg/qzcg
363	3953-7721	R. A. Fishel	Dennis H. Woodward	1971	H	780	S	Trg/qzcg
367	3958-7704	Pa. Game Comm.	Harrisburg's Kohl Bros.	1970	H	555	V	Trg/ss
368	3958-7704	Bermudian Springs Sch.	Sprague & Henwood, Inc.	1960	T	620	H	Trg/sh
369	4001-7703	Robert Duncan	Weldo W. Funt	1974	H	595	H	Trg/ss
370	4001-7703	John Adams	do.	1971	H	570	S	Trg/ss
371	3955-7703	Donald Kauffman	do.	1972	H	475	V	Trg/sh
372	3955-7703	C. E. Stockham	do.	1973	U	475	V	Trg/ss
373	3955-7703	Lealand Shearer	do.	1972	H	475	V	Trg/sh
374	3955-7707	P. H. Riley	do.	1973	H	536	H	Trg/sh
376	3953-7706	Charles Williams	William W. Reichart	1974	H	540	S	Trd/db
377	3953-7706	Merl Mummert	do.	1975	H	570	S	Trd/db
378	3956-7703	Reading Twp.	Dennis H. Woodward	1975	H	555	V	Trd/db
381	3945-7716	Timeless Towns	do.	1972	C	490	V	Trd/db
382	3945-7716	do.	do.	1972	C	500	S	Trd/db
383	3945-7716	do.	do.	1972	U	520	S	Trd/db
384	3945-7716	do.	Ralph E. Robison	1972	U	522	S	Trd/db
385	3945-7716	do.	do.	1972	C	520	S	Trd/db
386	3946-7716	do.	do.	1972	U	525	S	Trd/db
387	3946-7716	do.	do.	1972	U	525	S	Trd/db
388	3946-7716	do.	do.	1972	C	525	S	Trd/db
389	3945-7715	do.	do.	1972	C	485	V	Trd/db
390	3945-7715	do.	do.	1972	C	495	V	Trd/db
391	3945-7715	do.	do.	1973	U	490	V	Trd/db
392	3945-7716	do.	do.	1973	C	480	V	Trd/db
394	3955-7715	Biglerville Water Co.	Eichelberger Well Drilling	1977	P	640	V	Trg/sh
395	3948-7710	Lake Heritage Utilities, Inc.	Moody Drilling Co., Inc.	1965	U	530	V	Trg/sh
								BERKS
Be- 50	4013-7554	Maurice Moyer	---	---	H	700	H	Trhc/ss
81	4013-7550	Charles Dolan	---	---	U	335	V	Trhc/qzcg
82	4017-7601	Panitz Mobile Home Park	Moody Drilling Co., Inc.	1971	P	750	V	Trhc/ss
127	4013-7550	David Mackamer	Petersheim Bros.	1922	H	330	V	Trhc/qzcg
136	4012-7553	Green Hills Sportsman's Club	Richard H. Stanley	1954	C	775	H	Trhc/ss
152	4017-7600	Charles Rohrbacher	do.	1955	H	615	V	Trd/db
221	4016-7559	Shillington Bor.	Kohl Bros., Inc.	1932	U	480	V	Trd/db
222	4017-7558	do.	do.	1934	U	370	V	Trhc/sh
265	4016-7556	Everett Walk	do.	1964	H	490	V	Trhc/qzcg
301	4017-7551	Crompton & Knowles Corp.	do.	1963	U	170	V	Trhc/sh
305	4018-7553	Reading Bone Fertilizer Co.	do.	1944	N	240	V	Trhc/lscg
310	4017-7558	Shillington Bor.	do.	1939	U	360	V	Trhc/sh
316	4016-7555	Flying Hills Water Co.	Moody Drilling Co., Inc.	1971	P	310	V	Trhc/qzcg
366	4013-7556	Berks Co. Council Camp Fire Girls	Kohl Bros., Inc.	1963	T	460	S	Trhc/qzcg
369	4012-7548	French Creek St. Pk.	do.	1957	H	625	V	Trhc/sh
370	4012-7548	do.	do.	1937	U	1000	H	Trhc/qzcg
382	4013-7547	do.	do.	1954	U	770	S	Trhc/qzcg
383	4012-7548	do.	do.	1954	H	620	V	Trhc/qzcg
389	4012-7548	do.	do.	1956	H	1000	H	Trhc/qzcg
410	4017-7600	Shillington Bor.	do.	1955	U	515	V	Trhc/sh
474	4014-7552	Robeson Twp. Sch.	do.	1955	T	500	H	Trhc/qzcg
516	4015-7548	Birdsboro Munic. Auth.	do.	1942	U	220	S	Trhc/sh
567	4015-7559	Sherman Sweigart	George Griffith	1958	H	700	V	Trhc/qzcg
568	4014-7556	William Moore	do.	1958	S	385	V	Trhc/sh
569	4017-7558	Jacob Jasinski	Stephen Szilli	1957	H	380	S	Trhc/sh
600	4015-7554	Ralph McCoy	Kohl Bros., Inc.	1968	P	320	V	Trhc/qzcg

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gpm)	Specific capacity (gpm/ft)	Hard-ness (gpg)	Specific conduc-tance (micro-mhos at 25 C)	pH	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
220	24	6	85;110;210	19	8/76	40	.22	9	350	---	Ad- 345
57	12	8	38;53	7	11/74	112	6.6	9	350	6.6	346
48	37	8	42	12	12/74	18	.9	---	---	---	347
48	42	6	40	14	3/75	15	1.1	10	315	---	348
220	24	6	85;110;160	48	8/74	20	---	8	300	---	349
90	---	6	---	6	9/70	8	.12	10	380	---	350
124	24	6	52;114	10	7/73	8	.2	---	490	---	351
120	24	6	100	---	---	12	---	---	---	---	352
115	45	6	105	---	---	12	---	9	280	---	353
120	23	6	75;120	---	---	7	---	10	340	---	354
35	17	6	25	---	---	20	---	14	480	6.8	355
36	27	6	32	10	12/74	12	.67	---	---	---	356
100	60	8	---	26	8/76	300	15	7	295	---	357
242	---	6	---	10	8/76	100	---	20	750	---	358
68	29	6	60	16	8/73	12	.30	---	820	---	359
100	22	6	---	20	6/75	10	---	14	530	---	360
200	56	6	148	55	8/76	3	.02	3	110	---	361
60	50	6	56	---	---	10	---	1	50	---	362
100	---	6	85	35	6/71	25	---	---	---	---	363
250	34	6	196;250	20	3/70	20	.15	9	380	7.3	367
220	---	---	---	20	8/76	---	---	15	590	---	368
70	22	6	52;66	18	6/74	---	---	12	470	6.9	369
100	20	6	62;90	22	1/73	12	.19	---	---	---	370
140	23	6	118;132	30	8/72	10	.17	8	---	---	371
212	30	6	146;164	50	8/76	18	.16	---	---	---	372
125	23	6	116	32	8/72	7	.09	---	---	---	373
180	21	6	92;170	30	6/73	12	.1	10	340	---	374
180	23	6	55;118;170	50	---	---	---	9	420	---	376
260	34	6	34;210	10	7/75	3	---	9	320	6.4	377
250	20	6	125	14	8/76	8	---	13	500	---	378
300	---	6	---	---	---	8	---	---	---	---	381
300	---	6	---	---	---	18	---	---	---	---	382
300	21	6	---	---	---	0	---	---	---	---	383
200	31	6	---	14	7/76	4	---	---	---	---	384
100	20	6	---	---	---	20	---	---	---	---	385
120	---	6	---	---	---	0	---	---	---	---	386
100	---	6	---	---	---	0	---	---	---	---	387
135	22	6	---	---	---	7	---	---	---	---	388
240	---	6	---	---	---	8	---	7	250	---	389
105	---	6	---	---	---	20	---	---	---	---	390
122	---	6	---	8	7/76	8	---	---	---	---	391
---	---	6	---	---	---	20	---	---	---	---	392
400	77	8	118;175;250; 280;352	10	10/77	150	.73	12	475	---	394
499	39	6	---	21	7/65	30	.12	---	---	---	395
COUNTY											
100	20	---	---	80	---	5	---	1	---	---	8e- 50
70	45	6	---	15	1964	15	---	2	---	---	81
435	38	8	64;150;200; 332;435	30	11/71	55	.59	7	---	8.0	82
56	30	6	---	13	---	20	---	---	---	---	127
135	23	6	---	100	1954	7	---	3	110	---	136
75	42	6	---	10	---	9	---	---	---	---	152
286	---	8	---	---	---	45	---	---	---	---	221
450	---	8	---	---	---	150	---	---	---	---	222
220	21	6	120;168	1	4/64	12	.06	---	---	---	265
200	34	6	76;90;113;150	18	4/77	164	1.5	6	238	---	301
500	100	6	---	79	4/77	300	---	17	680	---	305
261	13	6	---	---	---	---	---	---	---	---	310
369	43	8	101;155;181; 243	F	5/71	267	3.2	5	260	6.8	316
230	86	6	92;120;135;170	18	2/63	180	.99	3	120	---	366
110	94	6	106	22	5/57	25	---	6	250	---	369
300	65	6	70;266	---	---	32	---	---	---	---	370
160	68	6	---	102	5/54	---	---	---	---	---	382
95	68	6	---	10	5/54	10	---	---	---	---	383
300	164	4	---	220	---	6	---	1	50	---	389
500	49	8	---	22	9/55	110	.33	---	---	---	410
165	51	---	---	45	8/55	45	.82	---	230	---	474
380	30	8	---	26	10/42	340	2.7	50	---	---	516
---	42	6	18;42	12	3/58	---	---	3	110	---	567
100	26	6	52;76;90	34	5/58	12	.57	---	---	---	568
---	36	6	40	11	4/71	8	---	8	330	7.7	569
210	33	6	152;194	27	2/68	25	.27	---	---	---	600

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Be- 601	4015-7554	Ralph McCoy	Kohl Bros., Inc.	1967	U	345	S	Trhc/qzcg
605	4016-7601	Frank Gross	Richard H. Stanley	1968	I	780	S	Trhc/ss
651	4015-7547	Birdsboro Munic. Auth.	Kohl Bros., Inc.	1960	U	200	S	Trhc/ss
652	4015-7547	do.	do.	1960	U	180	V	Trhc/ss
813	4016-7601	Gouglersville Fire Co.	C. S. Garber & Sons, Inc.	1951	C	750	S	Trhc/ss
1209	4013-7549	Samuel McMullen	Kerr Bros.	1968	U	550	S	Trhc/qzcg
1210	4013-7549	do.	do.	1973	H	565	S	Trhc/qzcg
1211	4015-7546	Yellow Freight System, Inc.	James Bucci	1972	C	180	V	Trhc/sh
1212	4017-7603	Norman Coller	Morris Bailey	1968	H	500	V	Trd/db
1213	4016-7603	Koch's Nursery	Kohl Bros., Inc.	1969	C	870	S	Trhc/ss
1214	4017-7601	William Lorah	Robert O. Grant	1968	H	570	S	Trd/db
1215	4017-7600	M. E. Frees	Richard H. Stanley	1969	H	640	S	Trd/db
1216	4017-7600	Anthony Menalis	Kohl Bros., Inc.	1968	H	600	S	Trhc/ss
1217	4017-7602	Kenneth Buller	Robert O. Grant	1968	R	445	V	Trd/db
1218	4017-7602	do.	Kohl Bros., Inc.	1972	H	445	V	Trd/db
1219	4016-7602	Richard Moyer	do.	1973	H	820	S	Trd/db
1220	4016-7600	W. E. Schonour	Robert O. Grant	1968	H	640	S	Trhc/qzcg
1221	4015-7600	Leon Foster	Richard H. Stanley	1972	H	840	H	Trhc/qzcg
1222	4017-7606	R. R. Gutshall	Robert O. Grant	1972	H	595	V	Trhc/qzcg
1223	4017-7604	John Preska	do.	1973	H	580	H	Trhc/sh
1224	4014-7601	P. O. Swartz	Richard H. Stanley	1975	H	725	S	Trhc/ss
1225	4011-7556	Eric Hansen	Petersheim Bros.	1969	H	890	S	Trd/db
1227	4012-7554	Edward Cooper	Kerr Bros.	1973	H	710	H	Trhc/ss
1228	4013-7554	Denton Connor	Robert O. Grant	1967	H	725	H	Trhc/ss
1229	4013-7553	Green Hills Sports Camp	Petersheim Bros.	1976	R	640	S	Trhc/ss
1230	4013-7653	Elmer Gicker	Kohl Bros., Inc.	1958	H	530	S	Trhc/ss
1231	4013-7553	Davida Pines	Kerr Bros.	1967	U	420	V	Trhc/ss
1232	4013-7554	Eugene Mountz	do.	1974	H	600	S	Trhc/ss
1233	4014-7554	James Condict	do.	1975	H	460	H	Trhc/ss
1234	4012-7555	Albert Seisler Machine Corp.	Petersheim Bros.	1967	C	665	S	Trhc/ss
1235	4013-7555	Laura Cylcewski	Kerr Bros.	1967	H	440	S	Trhc/ss
1236	4014-7556	E. E. Troxelle	George Griffith	1967	H	415	V	Trhc/sh
1237	4013-7557	Carl Neatock	Kerr Bros.	1968	H	470	S	Trhc/ss
1238	4013-7557	Howard Kern	George Griffith	1966	H	570	S	Trhc/ss
1239	4012-7557	J. F. Lewis	do.	1967	H	600	S	Trhc/sh
1240	4012-7558	Walter Blimline	Robert O. Grant	1973	H	560	S	Trhc/sh
1241	4014-7557	Donald Swanger	Richard H. Stanley	1967	H	540	S	Trhc/qzcg
1242	4014-7559	John Seyfert	George Griffith	1966	H	760	S	Trhc/ss
1243	4014-7658	John Tibbetts	Richard H. Stanley	1972	H	720	S	Trhc/ss
1244	4016-7558	W. E. Morey, Jr.	Kohl Bros., Inc.	1969	H	920	H	Trhc/qzcg
1245	4014-7557	Robert Weihe	Kerr Bros.	1966	H	780	H	Trhc/ss
1246	4015-7557	Dennis Hatt	Robert O. Grant	1967	H	620	S	Trhc/qzcg
1247	4015-7556	William Weeks	James Bucci	1967	H	800	H	Trhc/qzcg
1248	4016-7556	Paul Yerger	Petersheim Bros.	1966	H	560	S	Trhc/qzcg
1249	4016-7556	John Pepple	Kohl Bros., Inc.	1972	H	530	S	Trhc/qzcg
1250	4016-7555	R. H. Detweiler	do.	1957	H	395	V	Trhc/qzcg
1251	4015-7555	Gilbert Commonwealth Co.	Layne-New York Co., Inc.	1970	C	429	V	Trhc/qzcg
1252	4015-7555	do.	do.	1970	C	416	V	Trhc/qzcg
1253	4016-7552	Geoffrey Tyson	Kerr Bros.	1972	H	280	V	Trhc/qzcg
1254	4015-7553	Delos Stoudt	do.	1975	H	400	H	Trhc/qzcg
1255	4017-7558	Russell Werner	George Griffith	1966	H	400	S	Trhc/sh
1256	4017-7558	Max Bingaman	do.	1967	H	600	H	Trhc/sh
1257	4016-7557	David Kinkaid	Kohl Bros., Inc.	1966	H	470	S	Trd/db
1258	4017-7555	Reading Rehab. Hosp.	do.	1968	U	340	S	Trd/db
1259	4017-7555	do.	do.	1968	T	260	V	Trhc/ss
1260	4017-7555	do.	---	---	T	440	S	Trhc/sh
1261	4017-7553	Bruce Clelland	Kohl Bros., Inc.	1969	H	230	V	Trhc/sh
1262	4017-7552	St. John's Lutheran Ch.	do.	1965	H	170	V	Trhc/ss
1263	4015-7548	Birdsboro Corp.	C. S. Garber & Sons, Inc.	1957	N	180	V	Trhc/sh
1264	4015-7549	Richard Doaty	Kerr Bros.	1969	H	380	S	Trhc/ss
1265	4015-7550	Verne Snyder	do.	1973	H	630	S	Trd/db
1266	4016-7551	Crompton & Knowles Corp.	Kohl Bros., Inc.	1968	N	170	V	Trhc/ss
1267	4016-7551	do.	do.	1965	N	170	V	Trhc/ss
1268	4016-7551	Charles Kramlich	Kerr Bros.	1973	H	340	S	Trhc/qzcg
1269	4014-7551	Elwood Keifer	do.	1968	H	410	V	Trhc/qzcg
1270	4012-7550	Walter McGowan	do.	1966	H	420	S	Trhc/qzcg
1271	4013-7550	Raymond Keinard	do.	1969	H	465	S	Trhc/qzcg
1272	4013-7548	Jane Smith	do.	1969	H	635	S	Trhc/qzcg
1273	4014-7547	L. M. Rock	C. S. Garber & Sons, Inc.	1973	H	520	S	Trhc/qzcg
1274	4014-7514	Gambone Brothers	do.	1972	U	275	H	Trhc/sh
1275	4014-7544	James Murphy	do.	1975	H	290	S	Trhc/sh
1276	4014-7542	Daniel Lucas	do.	1974	H	170	V	Trhc/sh

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
320	49	6	149	52	12/67	8	.03	---	---	---	Be- 601
200	108	6	80;135;155	80	10/68	30	3.0	---	---	---	605
205	45	8	---	2	4/60	80	.54	7	---	7.5	651
246	60	8	91;221	3	6/60	110	.75	6	300	---	652
231	80	8	---	30	4/51	237	4.7	4	205	---	813
107	21	6	70;100	70	10/68	10	.27	---	---	---	1209
127	25	6	---	87	1973	---	---	1	55	---	1210
140	23	6	40;70;135	40	---	20	---	4	180	5.6	1211
102	22	6	90	30	3/68	---	10	5	190	6.2	1212
95	45	6	58;75;85	40	2/69	30	.75	5	180	5.2	1213
51	51	6	51	10	9/68	3	.07	4	200	---	1214
152	20	6	---	23	3/69	1	.01	---	---	---	1215
220	43	6	62;74;116;199	60	8/68	70	.50	---	100	---	1216
78	33	5	4;37;75	7	12/68	6	.08	6	290	---	1217
405	60	6	138;172;308; 380	F	2/72	8	.02	33	1100	---	1218
95	51	6	58;72;84	8	7/73	30	.35	4	150	---	1219
65	36	6	18;37;61	24	6/68	20	.95	3	135	---	1220
160	64	6	97;155	85	5/72	10	.67	2	95	---	1221
86	46	6	68;82	14	8/72	30	.59	5	170	---	1222
106	57	6	68;82;101	39	3/77	22	.43	6	245	---	1223
55	40	6	50	---	8/75	40	40	4	190	---	1224
303	30	6	40;275	21	3/77	2	---	2	125	---	1225
100	33	6	65;95	37	8/73	15	.25	5	200	---	1227
250	160	6	53;241	164	3/77	12	.40	2	85	---	1228
340	80	6	165;235;250; 320	89	3/77	45	.43	1	85	---	1229
160	54	6	100	65	12/58	5	.14	---	---	---	1230
100	30	6	60;95	24	9/67	20	.45	---	---	---	1231
115	20	6	80;95;110	76	7/74	15	.50	5	180	---	1232
139	18	6	50;130	84	6/75	6	.12	1	50	---	1233
94	62	6	75;85	30	8/67	60	---	3	110	---	1234
85	22	6	62;84	41	7/67	20	3.0	3	150	---	1235
66	26	6	18;48;59	15	6/67	30	30	3	115	---	1236
85	22	6	51;83	28	4/68	20	.62	1	70	---	1237
55	29	6	38;53	9	11/66	30	10	2	140	---	1238
112	26	6	76;108	40	4/67	12	.34	1	35	---	1239
50	22	6	21;28;34;42	F	3/73	45	4.5	4	180	---	1240
52	---	6	40	11	6/67	20	20	3	130	---	1241
115	28	6	76;98;112	45	10/66	5	.10	1	80	---	1242
90	62	6	40;70;85	33	5/72	20	1	---	---	---	1243
505	104	6	260;445	140	3/69	8	.02	1	35	---	1244
125	37	6	104;123	86	4/66	5	5	2	110	---	1245
175	62	6	83;127;171	62	9/67	7	.06	3	110	---	1246
251	34	6	55;180;205	80	6/67	10	---	3	130	---	1247
217	46	6	80;140;205	50	3/66	12	---	2	150	---	1248
160	42	6	72;134	62	4/77	12	.11	2	110	---	1249
70	36	6	44;69	15	5/57	20	4.0	---	---	---	1250
400	---	8	---	36	12/70	120	.69	3	---	---	1251
335	---	8	---	40	1/77	300	2.8	3	160	5.9	1252
80	23	6	56;78	17	1/72	20	.47	2	100	---	1253
80	21	6	50;70	50	5/75	20	1.0	1	75	---	1254
86	22	6	58;84	25	9/66	9	---	5	240	---	1255
90	72	6	64;76;88	48	4/67	15	1.3	---	---	---	1256
200	18	6	195	12	8/66	10	.05	5	200	---	1257
300	45	6	68;115	35	12/68	2	.01	---	---	---	1258
158	34	6	38;50;138	F	12/68	100	1.3	13	540	---	1259
300	---	8	---	---	---	---	---	---	---	---	1260
110	46	6	50;80	20	4/69	60	.75	4	175	---	1261
200	34	6	50;76;120;179	23	6/65	150	.96	10	400	---	1262
300	58	10	---	12	10/58	144	1.3	12	450	7.5	1263
70	13	6	42;63;70	32	3/69	12	.38	3	145	---	1264
29	20	6	21;27	10	7/73	20	3.3	8	290	---	1265
300	124	10	145;230;265;288	12	4/68	325	2.4	11	420	7.2	1266
220	32	6	35;52;74;115;200	18	7/65	230	19	9	---	6.6	1267
100	26	6	45;95	36	12/73	20	.45	3	150	---	1268
52	15	6	40;50	16	8/68	20	5.0	---	---	---	1269
100	40	6	59;89	52	10/66	22	.96	---	---	---	1270
82	17	6	49;82	24	5/69	11	.19	4	150	---	1271
100	17	6	62;91	50	2/69	16	.53	1	50	---	1272
280	32	6	140;260	100	3/73	5	.03	7	320	---	1273
150	40	6	70;130	18	10/72	60	.45	---	---	---	1274
140	76	6	87;125	50	1/75	30	.33	2	60	6.0	1275
98	43	6	75;85	32	10/74	10	.15	4	220	---	1276

Table 17.

Well location								
Number	Lat-Long	Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Be-1277	4016-7551	Crompton & Knowles Corp.	Kohl Bros., Inc.	1977	N	170	V	Trhc/sh
1278	4016-7551	do.	do.	1977	U	170	V	Trhc/sh
1279	4016-7551	do.	do.	1977	U	170	V	Trhc/sh
1280	4016-7551	do.	do.	1977	U	170	V	Trhc/sh
1281	4017-7600	Spring Knoll	Moody Drilling Co., Inc.	1976	P	640	V	Trhc/ss
								CHESTER
Ch- 141	4011-7533	Pennhurst St. Sch.	---	---	U	250	S	Trhc/sh
142	4011-7533	do.	---	1928	U	235	S	Trhc/sh
143	4011-7533	do.	---	---	U	320	H	Trhc/sh
144	4011-7534	do.	---	---	T	320	H	Trhc/sh
145	4011-7534	do.	---	---	U	325	H	Trhc/sh
146	4011-7534	do.	---	---	U	345	H	Trhc/sh
147	4011-7533	do.	F. L. Bollinger & Sons	---	T	310	S	Trhc/sh
148	4010-7532	Spring City Bleach and Dye	---	1905	U	100	V	Trhc/sh
149	4010-7532	do.	Kermit S. Snyder	1949	U	100	V	Trhc/sh
150	4010-7532	do.	do.	1954	U	100	V	Trhc/sh
181	4011-7534	Pennhurst St. Sch.	F. L. Bollinger & Sons	1963	T	275	S	Trhc/sh
223	4010-7532	Wilcox-Woolford Corp.	Kohl Bros., Inc.	1957	N	205	S	Trhc/sh
248	4012-7536	East Coventry Sch.	Thomas G. Keyes	1962	T	244	S	Trhc/sh
312	4013-7541	Laurel Locks Farm	Kohl Bros., Inc.	1952	H	335	H	Trhc/qzcg
1355	4009-7549	Terry Hartman	Petersheim Bros.	1971	H	700	S	Trd/db
1356	4009-7549	Jeffrey Schurr	do.	1970	H	720	S	Trd/db
1488	4010-7547	Winfield Hamilton	Michael Kuszyk	1968	H	646	S	Trd/db
1495	4010-7543	Sue Eisemann	Petersheim Bros.	1970	H	550	S	Trd/db
1496	4011-7541	Walter McAllicher	do.	1970	H	638	S	Trhc/qzcg
1502	4010-7540	Edward Martinko	Michael Kuszyk	1970	H	466	S	Trhc/qzcg
1503	4012-7539	Baker's Garage	do.	1968	C	312	S	Trhc/sh
1525	4013-7540	John Ellwanger	do.	1968	H	247	S	Trhc/qzcg
1526	4014-7540	R. L. Smith	Douglas K. Reigner	1967	H	198	S	Trhc/ss
1527	4014-7539	Joseph Galamba	Michael Kuszyk	1968	H	165	S	Trhc/ss
1528	4012-7540	Gerald Klein	do.	1969	H	346	S	Trhc/qzcg
1529	4013-7541	A. C. Cotton	do.	1971	H	330	S	Trhc/ss
1530	4013-7541	Harold Garner	do.	1972	H	375	S	Trhc/qzcg
1531	4014-7541	Claude Shelton	Petersheim Bros.	1971	U	160	S	Trhc/ss
1532	4013-7542	David McGrath	Douglas K. Reigner	1971	H	250	S	Trhc/qzcg
1533	4013-7543	Goldie Gentzler	Michael Kuszyk	1967	H	347	V	Trhc/ss
1534	4011-7538	William Hirst	do.	1968	H	348	S	Trhc/ss
1535	4012-7539	Edward Serle	Kohl Bros., Inc.	1970	H	290	S	Trhc/ss
1536	4012-7538	Harold Kulp	Douglas K. Reigner	1970	H	282	S	Trhc/ss
1537	4012-7537	Ray Kelius	Michael Kuszyk	1967	H	254	H	Trhc/ss
1538	4013-7537	Paul Wolf	do.	1966	H	295	H	Trhc/sh
1541	4012-7539	Paul Mitchell	Douglas K. Reigner	1967	H	475	S	Trhc/sh
1542	4011-7540	J. Flickinger	Michael Kuszyk	1967	H	333	S	Trhc/qzcg
1545	4013-7536	Flora Pufko	Douglas K. Reigner	1967	H	234	S	Trhc/sh
1546	4012-7535	Structural Foam Inc.	Michael Kuszyk	1971	N	122	V	Trhc/ss
1547	4012-7535	Harold Church	do.	1967	H	132	V	Trhc/sh
1548	4010-7507	William Pine	do.	1969	H	395	S	Trhc/ss
1549	4011-7538	Charles McFarland	Douglas K. Reigner	1968	H	192	V	Trhc/qzcg
1550	4012-7537	Doug Kulp	do.	1972	H	222	S	Trhc/sh
1551	4011-7537	Carl Shindle	Michael Kuszyk	1971	H	258	S	Trhc/sh
1552	4012-7537	J. W. Moyer	do.	1966	H	162	V	Trhc/ss
1553	4010-7537	John Dimascio	Douglas K. Reigner	1970	H	305	S	Trhc/ss
1562	4010-7532	John Maskulak	do.	1967	H	258	S	Trhc/sh
1563	4011-7534	Dale Budd	do.	1967	H	260	S	Trhc/sh
1567	4009-7535	Bowman Hicks	Brookover Well Drlg. Co.	1973	H	364	S	Trhc/ss
1568	4010-7536	Donald Kahler	Michael Kuszyk	1966	H	349	S	Trhc/ss
2149	4011-7534	Citizens Utilities Home Water Co.	Rulon and Cook, Inc.	1972	P	107	V	Trhc/ss
2209	4011-7538	James Curry	Douglas K. Reigner	1966	H	255	S	Trhc/qzcg
2222	4010-7534	Art Stauffer	do.	1967	H	230	V	Trhc/sh
2237	4012-7543	Irvin Neims	Michael Kuszyk	1969	H	695	S	Trhc/ss
2238	4013-7541	Norman Hansen	do.	1967	H	335	S	Trhc/ss
2239	4013-7542	Dick Smith	Douglas K. Reigner	1969	H	290	S	Trhc/qzcg
2240	4012-7542	Paul Zimmer	Petersheim Bros.	1973	H	700	S	Trhc/qzcg
2247	4011-7541	Wayne Long	Michael Kuszyk	1967	H	645	S	Trhc/qzcg
2248	4011-7541	Carl Missimer	Petersheim Bros.	1973	H	625	S	Trhc/qzcg
2321	4010-7543	E. L. White	C. S. Garber & Sons, Inc.	---	H	565	H	Trd/db
2345	4012-7535	James Taylor	do.	1974	H	122	V	Trhc/ss
2346	4011-7538	F. L. Bissinger	do.	1974	H	260	S	Trhc/sh
2349	4012-7539	Atlantic Oil Co.	do.	1974	C	350	S	Trhc/sh
2353	4012-7535	Allied Steel Co.	do.	1973	N	128	V	Trhc/sh
2354	4012-7535	Ches-Mont Carpet Ctr.	do.	1974	C	130	V	Trhc/sh
2355	4012-7536	Coventry Terrace Park	do.	1974	P	150	V	Trhc/sh

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gpm)	Specific capacity (gpm/ft)	Hard-ness (gpg)	Specific conduc-tance (micro-mhos at 25°C)	pH	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
400	30	10	74;93;180;215; 235;265;305	13	6/77	800	4.6	15	875	---	8e-1277
325	40	6	50;94;175;205; 282	12	6/77	125	---	---	---	---	1278
215	36	6	65;101;130;155	16	6/77	120	---	---	---	---	1279
110	36	6	84;93;110	15	6/77	60	.67	---	---	---	1280
453	34	8	243;378;423	18	4/76	75	.30	6	---	7.8	1281
COUNTY											
327	---	8	---	52	1948	90	0.5	5	---	---	Ch- 141
529	172	8	---	42	3/28	60	1.5	14	---	---	142
443	---	8	---	---	---	40	---	---	---	---	143
421	---	8	---	---	---	144	18	9	---	---	144
404	---	8	---	---	---	122	4.9	9	---	---	145
400	---	8	---	---	---	---	---	---	---	---	146
804	74	12	---	---	---	200	3.3	15	---	---	147
180	18	8	---	---	---	140	---	10	540	6.8	148
230	22	8	---	30	5/56	150	3.8	12	620	6.7	149
260	---	8	---	30	5/56	220	5.5	8	410	6.7	150
700	93	10	---	132	4/63	224	2	---	---	---	181
97	77	8	82;90;96	24	9/57	132	2.4	---	---	---	223
202	64	6	70;112;120; 137;195	26	3/62	35	0.4	3	---	7.3	248
260	42	6	---	85	7/52	40	1.7	---	---	---	312
123	51	6	110	---	---	20	---	3	110	6.0	1355
158	57	6	65;150	25	12/70	5	---	---	---	---	1356
91	30	6	42;81	---	---	8	---	---	---	---	1488
112	30	6	37;95	40	5/70	10	---	---	---	---	1495
108	70	6	80;95	65	6/70	50	---	1	50	5.4	1496
125	50	6	92;117	---	---	12	---	2	110	5.7	1502
125	43	6	96;115	---	---	6	---	5	280	7.1	1503
172	51	6	136;158;170	---	---	8	---	---	---	---	1525
80	27	6	43;72	---	---	8	---	10	460	7.2	1526
100	42	6	61;76;93	---	---	8	---	---	---	---	1527
125	47	6	92;118	---	---	12	---	6	220	7.0	1528
150	51	6	94;142	---	---	12	---	---	---	---	1529
125	45	6	92;118	---	---	14	---	---	---	---	1530
178	40	6	60;120	+1	5/74	15	---	---	---	---	1531
95	38	7	49;85	---	---	30	---	---	---	---	1532
98	48	6	72	---	---	15	---	---	---	---	1533
150	74	6	123;144	---	---	15	---	2	220	6.3	1534
140	99	6	109;134	16	11/70	20	0.2	---	---	---	1535
96	50	7	57;79;92	13	5/74	20	---	7	300	---	1536
125	38	6	76;118	---	---	14	---	15	680	7.6	1537
198	48	6	125;168;185	---	---	10	---	---	---	---	1538
115	47	6	67;107	---	---	25	---	---	---	---	1541
200	50	6	115;180	---	---	25	---	---	---	---	1542
136	27	6	66;97;131	---	---	5	---	---	---	---	1545
100	50	6	64;85	14	5/74	11	---	6	310	5.6	1546
123	24	6	110	---	---	12	---	8	320	7.2	1547
100	40	6	72;91	12	---	10	---	2	120	6.3	1548
86	43	7	51;78	---	---	12	---	2	100	5.8	1549
92	42	7	53;71;78	7	5/74	30	---	3	150	5.3	1550
150	51	6	128;142	49	5/74	15	---	1	70	5.7	1551
72	22	6	52;64	12	10/66	15	---	4	200	5.9	1552
95	29	6	38;62;80	---	---	15	---	---	---	---	1553
95	33	6	73;88	---	---	15	---	---	---	---	1562
115	33	6	54;67;111	---	---	7	---	7	360	5.9	1563
105	28	6	68;79;98	15	5/74	40	0.7	6	220	6.0	1567
98	43	6	62;89	---	---	15	---	8	340	6.4	1568
500	55	14	---	F	12/72	1300	11	6	200	7.2	2149
136	84	6	101;131	---	---	8	---	---	---	---	2209
89	28	6	52;81	---	---	20	---	---	---	---	2222
225	52	6	192;216	---	---	8	---	---	---	---	2237
98	50	6	88;94	---	---	14	---	---	---	---	2238
95	31	6	57;81;89	---	---	8	---	---	---	---	2239
265	79	6	190	---	---	12	---	2	70	5.8	2240
123	57	6	78;112	---	---	8	---	---	---	---	2247
145	56	6	120;138	---	---	30	---	---	---	---	2248
92	---	6	---	---	---	---	---	4	130	6.0	2321
90	42	6	47;80	18	7/74	80	1.1	---	---	---	2345
100	41	6	54;85	15	7/74	60	0.7	---	---	---	2346
200	121	6	140;165;185	30	2/74	60	0.4	---	---	---	2349
160	44	6	85;145	25	11/73	60	0.4	---	---	---	2353
100	42	6	65;85	30	3/74	80	1.1	---	---	---	2354
275	66	6	75;110;160; 225;260	37	8/74	160	0.7	---	---	---	2355

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Ch-2356	4010-7534	Richard Dolny	C. S. Garber & Sons, Inc.	1974	H	255	S	Trhc/ss
2363	4011-7534	J. R. Bari	---	1960	H	132	S	Trhc/sh
2364	4011-7535	G. P. Denger	C. S. Garber & Sons, Inc.	1976	H	149	S	Trhc/sh
2365	4011-7534	Francis Dorkowskie	do.	1976	H	160	S	Trhc/sh
2366	4011-7534	W. E. Frederich	---	1951	H	180	S	Trhc/sh
2367	4011-7534	Charles Frock	---	1949	H	140	S	Trhc/sh
2368	4011-7534	D. B. Heckman	C. S. Garber & Sons, Inc.	1976	H	115	V	Trhc/sh
2369	4011-7534	R. M. Heess	Kohl Bros., Inc.	1976	H	137	V	Trhc/sh
2370	4011-7535	Richard Jacobs	---	1976	H	209	S	Trhc/sh
2371	4011-7535	Thelma Kershbergen	---	1976	H	160	S	Trhc/sh
2372	4011-7535	Paul Kolb	C. S. Garber & Sons, Inc.	1976	S	193	S	Trhc/sh
2373	4011-7535	Daniel Kolb	do.	1976	H	141	S	Trhc/sh
2374	4011-7535	Paul Kolb	---	1931	U	175	S	Trhc/sh
2375	4011-7535	R. S. Kolb	---	---	H	150	S	Trhc/sh
2376	4011-7534	W. H. Montgomery	---	1965	H	182	S	Trhc/sh
2377	4011-7535	S. R. Prizer	Aaron Keiter	1895	I	180	S	Trhc/sh
2378	4011-7534	R. K. Reed	C. S. Garber & Sons, Inc.	1976	H	145	S	Trhc/sh
2379	4011-7534	N. G. Reitnour	---	1951	H	205	S	Trhc/sh
2380	4011-7536	Neill Reilly	C. S. Garber & Sons, Inc.	1976	H	242	S	Trhc/sh
2381	4011-7535	H. S. Tyson	---	---	H	150	S	Trhc/sh
2382	4011-7534	J. K. Weaver	---	1956	H	150	S	Trhc/sh
2383	4011-7534	R. G. Wensel	C. S. Garber & Sons, Inc.	1976	H	153	S	Trhc/sh
2384	4011-7534	R. E. Wilson	---	1972	H	180	S	Trhc/sh
2385	4011-7534	C. E. Collins	---	1951	H	190	S	Trhc/sh
2386	4011-7535	William Gorman	Douglas K. Reigner	1976	H	216	S	Trhc/ss
2387	4010-7535	Moles	---	---	H	244	S	Trhc/sh
2388	4011-7536	Meyers	---	1956	H	202	S	Trhc/sh
2390	4010-7535	Sunny Slope Dairy, Inc.	Kohl Bros., Inc.	1944	U	286	S	Trhc/sh
2391	4010-7535	do.	do.	1947	U	301	H	Trhc/sh
2392	4010-7535	do.	do.	1951	I	299	S	Trhc/sh
								CUMBERLAND
Cu- 243	4011-7654	Melvin Underkoffler	Harrisburg's Kohl Bros.	1967	H	360	V	Trg/ss
245	4009-7658	Spencer Nauman	do.	1967	H	425	S	Trg/lscg
811	4009-7659	Grantham Water Co.	Eichelberger Well Drilling	1971	U	460	S	Trg/lscg
812	4009-7659	do.	Harrisburg's Kohl Bros.	1950	U	510	S	Trg/lscg
813	4009-7659	do.	do.	1949	U	567	H	Trg/sh
817	4011-7656	George Thumlert, Jr.	Eichelberger Well Drilling	1976	H	580	H	Trg/lscg
								DAUPHIN
Da- 77	4012-7644	Fruehauf Corp.	D. W. Sunday	1958	U	385	S	Trg/ss
78	4012-7644	do.	do.	1958	U	385	S	Trg/ss
79	4012-7644	do.	Harrisburg's Kohl Bros.	1958	U	385	S	Trg/ss
80	4011-7644	Harrisburg Intl. Airport	do.	1941	P	320	V	Trg/shss
81	4011-7644	do.	do.	1941	P	320	V	Trg/shss
82	4011-7644	do.	do.	1941	P	320	V	Trg/shss
83	4011-7644	do.	do.	1941	P	320	V	Trg/shss
84	4011-7644	do.	do.	1917	P	320	V	Trg/shss
85	4011-7646	do.	do.	1943	P	305	V	Trg/shss
86	4011-7645	do.	do.	1943	U	305	V	Trg/shss
87	4011-7645	do.	do.	1944	U	305	V	Trg/shss
88	4011-7645	do.	do.	1954	P	305	V	Trg/shss
89	4011-7645	do.	do.	1953	U	305	V	Trg/shss
90	4011-7645	do.	do.	1955	P	305	V	Trg/shss
91	4011-7645	do.	do.	1955	P	305	V	Trg/shss
92	4011-7645	do.	do.	1955	P	305	V	Trg/shss
93	4011-7645	do.	do.	1955	P	305	V	Trg/shss
94	4012-7644	Gulf Oil Corp.	do.	1950	C	380	S	Trg/ss
95	4012-7644	do.	do.	1950	C	380	S	Trg/ss
96	4012-7644	do.	do.	1950	U	405	S	Trg/ss
97	4011-7644	Odd Fellows Home of Pa.	---	1929	T	340	V	Trg/shss
98	4011-7644	do.	---	1924	T	355	S	Trg/shss
99	4011-7643	Middletown Munic. Water Auth.	Harrisburg's Kohl Bros.	1957	P	301	V	Trg/shss
101	4012-7641	D. W. Rambler	do.	1957	H	510	V	Trd/db

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
140	55	6	60;95;110;130	37	10/74	100	1	---	---	---	Ch-2356
90	80	6	---	---	---	---	---	---	---	---	2363
170	82	6	115;140;165	11	8/74	100	.64	---	---	---	2364
250	132	6	160;185;196; 225	34	8/76	60	.30	---	---	---	2365
90	---	---	---	40	8/76	12	---	---	---	---	2366
45	---	6	---	29	8/76	---	---	---	---	---	2367
197	72	6	80;135;160;185	15	8/76	60	.32	---	---	---	2368
250	82	6	94;112;146; 174;220	34	8/76	100	.44	---	---	---	2369
195	---	---	---	F	7/76	---	---	---	---	---	2370
115	---	6	---	11	8/76	---	---	---	---	---	2371
200	46	6	105;140;160; 180	80	8/76	30	.25	---	---	---	2372
140	42	6	85;120;130	60	8/76	60	.79	---	---	---	2373
100	---	---	---	80	8/76	---	---	---	---	---	2374
90	---	6	---	27	8/76	25	5	---	---	---	2375
96	---	6	---	70	---	---	---	---	---	---	2376
30	---	---	---	F	---	---	---	---	---	---	2377
250	102	6	110;170;228; 245	43	8/76	80	.42	---	---	---	2378
81	78	---	---	65	8/76	---	---	---	---	---	2379
148	51	6	70;130	48	6/76	7	.07	---	---	---	2380
203	---	6	---	11	8/76	11	---	---	---	---	2381
125	---	---	---	40	1956	30	---	---	---	---	2382
250	84	6	90;140;210;244	55	8/76	80	.43	---	---	---	2383
120	30	---	---	47	8/76	---	---	---	---	---	2384
104	55	6	---	---	---	---	---	---	---	---	2385
94	43	6	67;88	52	8/76	15	---	---	---	---	2386
---	---	---	---	19	8/76	---	---	---	---	---	2387
80	---	---	---	---	---	---	---	---	---	---	2388
156	53	6	---	23	10/44	112	---	---	---	---	2390
137	64	6	---	36	9/47	20	.83	---	---	---	2391
232	60	6	---	32	4/51	165	---	10	540	7.4	2392
COUNTY											
89	30	6	75;85	17	2/67	24	.33	9	385	---	Cu- 243
137	59	6	80;120	45	9/67	---	.38	24	1040	---	245
300	---	---	55;70;100;287	---	---	75	.5	---	---	---	811
753	16	6	---	85	2/50	7	.05	---	---	---	812
500	15	6	---	173	7/76	26	.2	---	---	---	813
550	41	8	48	---	---	2	---	---	---	---	817
COUNTY											
700	---	8	---	20	1958	135	0.33	---	---	---	Da- 77
345	60	---	---	31	1958	66	0.42	---	---	---	78
300	---	6	---	97	1958	66	.61	---	---	---	79
629	100	10	---	94	7/43	250	7.1	---	---	---	80
450	104	10	---	108	---	290	2.3	---	---	---	81
450	100	10	---	109	11/51	190	7.9	---	---	---	82
459	100	10	---	44	10/41	140	1.8	---	---	---	83
776	250	8	---	40	5/43	185	6.6	---	---	---	84
500	40	12	---	42	6/43	340	16	---	---	---	85
450	100	10	---	3	4/43	225	1.4	---	---	---	86
452	---	8	---	66	5/44	130	.38	---	---	---	87
451	101	10	---	26	2/75	270	1.5	---	---	---	88
450	102	10	---	31	3/54	775	2.6	---	---	---	89
603	75	10	125;235;288; 425;520	30	9/55	660	6.6	---	---	---	90
600	76	10	---	25	8/55	640	18	---	---	---	91
800	76	10	---	18	2/56	485	2.7	---	---	---	92
800	75	10	100;185;230; 535;625;651	16	11/55	758	4.6	---	---	---	93
206	38	6	---	2	7/50	85	0.72	7	360	7.5	94
214	47	6	---	27	7/50	70	.62	7	360	7.5	95
203	42	6	---	26	6/50	85	.74	9	---	7.6	96
195	---	---	---	---	---	85	---	---	---	---	97
250	---	---	---	---	---	30	---	---	---	---	98
800	48	10	68;312;318	18	11/57	500	2.4	15	---	7.6	99
34	19	6	10;20	12	5/57	8	.33	8	350	6.7	101

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Da- 102	4014-7639	O. E. Koons	Harrisburg's Kohl Bros.	1950	H	670	V	Trg/ss
382	4010-7643	Londonderry Twp.	do.	1963	C	520	H	Trd/db
386	4011-7643	Middletown Munic. Water Auth.	do.	1957	P	325	V	Trg/shss
387	4013-7647	Dauphin Consolidated Water Co.	do.	1954	P	375	S	Trg/ss
388	4012-7643	H. M. Wilson	---	---	H	300	V	Trg/sh
402	4012-7646	Pennsy Supply	---	---	U	305	V	Trg/shss
403	4012-7647	Dauphin Consolidated Water Co.	Harrisburg's Kohl Bros.	1951	P	360	V	Trg/shss
404	4012-7646	do.	do.	1956	P	310	V	Trg/shss
424	4013-7644	Keith Condran	do.	1970	H	400	S	Trg/ss
425	4012-7648	Bethlehem Steel Co.	do.	1947	U	325	V	Trg/shss
426	4012-7648	do.	do.	1951	U	325	V	Trg/shss
427	4012-7644	Lutheran Tressler Service	do.	1958	U	420	H	Trg/ss
428	4012-7644	do.	do.	1959	U	420	H	Trg/ss
430	4011-7643	Glen-Gery Corp.	do.	1953	U	300	V	Trg/shss
455	4011-7643	Middletown Munic. Water Auth.	---	1932	P	300	V	Trg/shss
459	4012-7647	Redevelopment Auth.	---	---	U	310	V	Trg/shss
460	4012-7647	Abitibi	---	---	U	310	V	Trg/shss
461	4011-7643	Middletown Ice & Coal Co.	---	---	N	310	V	Trg/shss
463	4010-7643	Barnegat Light	---	---	U	300	V	Trg/shss
464	4012-7646	Pennsy Supply	---	---	U	---	V	Trg/shss
465	4011-7646	Harrisburg Intl. Airport	---	---	U	310	V	Trg/shss
466	4011-7646	do.	---	---	U	310	V	Trg/shss
489	4014-7641	B & J Water Co.	William Lester Etnoyer	1963	P	750	H	Trg/ss
490	4012-7648	Bethlehem Steel Co.	Harrisburg's Kohl Bros.	1943	U	325	V	Trg/shss
491	4012-7648	do.	do.	1943	U	325	V	Trg/shss
492	4012-7646	J. R. Egrisits	do.	1973	H	395	S	Trg/ss
496	4012-7647	Pa. Turnpike	---	---	C	395	H	Trg/ss
497	4012-7645	Gerald Yingst	Harrisburg's Kohl Bros.	1975	C	305	V	Trg/sh
498	4011-7644	Metropolitan Edison Co.	do.	1957	U	305	V	Trg/shss
499	4011-7643	Elks Theater	do.	1940	A	315	V	Trg/shss
500	4011-7644	Pennbrook Candy Co.	do.	1948	U	320	V	Trg/shss
501	4011-7643	Middletown Area Sch. Dist.	do.	1961	I	335	S	Trg/shss
502	4011-7643	Glen-Gery Corp.	do.	1946	U	298	V	Trg/shss
503	4010-7643	Barnegat Light	do.	1945	U	305	V	Trg/shss
504	4010-7643	do.	do.	1943	U	300	V	Trg/shss
505	4012-7644	Middletown Swim Club	do.	1957	R	435	H	Trg/ss
506	4013-7645	Stanley Wenner	do.	1974	H	465	S	Trg/ss
507	4012-7642	H. M. Wilson	do.	1973	H	315	S	Trg/sh
508	4012-7643	Am. Legion Post 594	do.	1950	A	360	S	Trg/shss
509	4012-7643	do.	do.	1950	U	360	S	Trg/shss
510	4009-7643	Metropolitan Edison Co.	do.	1969	C	340	V	Trg/ss
511	4009-7642	do.	do.	1971	H	315	V	Trg/ss
512	4010-7643	Harry Brickman	do.	1975	H	320	S	Trg/ss
513	4013-7647	Holiday East Motel	do.	1951	U	425	H	Trg/ss
514	4013-7647	do.	do.	1957	U	495	S	Trg/ss
515	4013-7647	do.	do.	1957	U	420	H	Trg/ss
516	4013-7647	do.	do.	1957	U	395	S	Trg/ss
517	4013-7647	do.	do.	1957	U	405	S	Trg/ss
518	4013-7647	do.	do.	1960	U	405	S	Trg/ss
519	4013-7647	do.	Eichelberger Well Drilling	1968	C	395	S	De/---
520	4013-7647	do.	do.	1975	C	400	S	De/---
521	4011-7642	Robert Rowland	Myers Bros. Drlg. Cont.	1974	H	460	H	Trg/ss
522	4009-7647	Phares Grove	Harrisburg's Kohl Bros.	1966	H	370	S	Trg/ss
523	4009-7642	Clair Hershey	do.	1972	H	315	V	Trg/sh
524	4010-7638	Nelson Investment	Eichelberger Well Drilling	1972	P	420	V	Trg/sh
525	4012-7641	Edward Lillpop	Harrisburg's Kohl Bros.	1967	H	445	S	Trd/db
526	4012-7634	K. R. Smith	Rufus A. Light	1971	H	510	S	Trg/ss
527	4011-7641	Mrs. Truman Peters	Harrisburg's Kohl Bros.	1969	H	540	H	Trd/db
528	4011-7641	Ralph Corby	do.	1975	H	460	S	Trg/ss
529	4012-7641	Jacob Brubaker	do.	1969	H	365	S	Trg/sh
530	4012-7644	Middletown Munic. Water Auth.	William Stothoff Co.	1977	P	410	H	Trg/ss
531	4011-7640	Londonderry Elem. Sch.	Harrisburg's Kohl Bros.	1954	T	570	H	Trg/ss
532	4012-7641	W. C. Hoke	do.	1968	H	445	S	Trd/db
533	4012-7641	Mrs. Clarence Hoke	do.	1966	H	430	S	Trg/ss
534	4010-7639	H. F. Still, Jr.	do.	1966	H	395	V	Trg/ss
535	4011-7641	Bernard Parrett	do.	1966	H	510	S	Trd/db
536	4012-7641	David Sheaffer	do.	1966	H	465	S	Trd/db
537	4012-7641	Pa. Dept. of Trans.	do.	1968	U	365	S	Trg/sh
538	4012-7641	George Zinkan	do.	1972	H	550	S	Trg/ss

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
78	62	6	---	15	3/50	20	---	1	75	[illegible]	Da- 102
81	17	6	48;78	45	8/63	18	---	---	---	---	382
500	100	8	82;95;120;240;320	50	7/57	182	1.5	11	385	---	386
400	47	6	---	12	---	24	---	15	---	7.3	387
40	---	6	---	---	---	---	---	---	---	---	388
700	---	10	---	20	---	450	3.7	---	---	---	402
806	30	8	---	15	11/51	150	---	---	---	---	403
878	30	10	---	22	1956	265	.72	14	---	7.4	404
180	40	6	65;155	55	11/70	15	.12	10	540	---	424
500	---	8	---	30	1947	165	1.4	---	---	---	425
500	30	8	---	---	1951	85	.71	---	---	---	426
550	---	6	---	50	7/58	82	0.31	13	---	6.5	427
447	---	6	---	---	---	---	---	---	---	---	428
211	18	6	96;150;173	50	11/53	100	2.0	---	---	---	430
450	---	8	---	16	1934	600	6.7	18	---	7.3	455
80	---	6	---	---	---	20	---	---	---	---	459
200	---	8	---	---	---	100	---	---	---	---	460
300	---	8	---	47	10/75	80	---	16	780	---	461
80	---	6	---	20	---	60	---	---	---	---	463
500	---	8	---	20	---	200	---	---	---	---	464
120	---	6	---	20	---	250	---	---	---	---	465
225	---	6	---	20	---	200	67	---	---	---	466
253	62	6	168;224	166	1963	20	.56	2	---	6.3	489
500	38	8	---	18	12/43	150	.85	---	---	---	490
894	35	10	---	18	4/43	85	.60	---	---	---	491
80	60	6	50;70	35	8/73	20	.44	6	330	---	492
102	---	8	---	25	4/67	5	.37	---	---	---	496
120	50	6	---	20	8/75	40	.40	---	---	---	497
244	20	6	---	---	---	220	---	---	---	---	498
308	20	8	---	25	11/40	200	6.7	---	---	---	499
250	27	6	---	20	9/48	100	10	---	---	---	500
300	40	6	85;285	45	1/61	73	.95	---	---	---	501
300	16	---	---	48	---	---	---	---	---	---	502
590	39	8	---	15	---	110	---	---	---	---	503
500	25	---	---	30	---	100	---	---	---	---	504
250	54	6	---	30	6/57	90	.47	---	---	---	505
220	102	6	178;193	145	9/74	20	.27	---	---	---	506
200	40	6	80;180	10	3/73	10	.05	26	1120	---	507
512	50	8	---	31	3/50	126	.84	---	---	---	508
500	50	8	---	---	---	---	---	---	---	---	509
120	55	6	73;101	56	6/69	30	.47	3	150	6.3	510
160	35	6	30;40;140	20	12/71	47	1.8	4	200	7.5	511
80	49	6	55;73	45	8/75	30	.86	5	250	---	512
289	40	6	---	30	2/51	8	.09	---	---	---	513
376	22	8	34;97;360	5	5/57	36	.65	---	---	---	514
205	26	8	42;76	4	4/57	7	---	---	---	---	515
311	28	8	60	4	5/57	3	---	---	---	---	516
367	49	8	---	15	6/57	10	.12	---	---	---	517
464	40	8	---	18	12/60	8	.04	---	---	---	518
710	---	6	---	28	1968	40	.60	---	---	---	519
725	87	8	648;655;676;699;723	38	11/75	300	1.2	24	750	---	520
275	17	6	---	---	---	1	---	7	350	---	521
140	97	6	110;120	67	10/75	55	.81	2	160	---	522
60	40	6	45;55	15	11/72	30	.67	---	---	---	523
307	41	6	96;142;187;247	---	---	30	---	8	440	---	524
90	23	6	60;81	17	6/67	15	.21	12	460	6.5	525
102	31	6	72;101	15	6/71	7	.10	15	570	6.7	526
300	20	6	180	13	8/76	1	.01	22	960	---	527
140	40	6	70;120	60	2/75	10	.12	8	325	---	528
80	32	6	40;60	20	2/69	25	.42	6	260	---	529
815	50	10	54;166;432;624;716	58	2/77	176	1.0	14	550	---	530
200	93	6	---	30	5/54	45	1.1	6	280	---	531
195	20	6	90;190	60	7/68	30	.30	---	910	---	532
138	28	6	80;116	65	7/66	40	.55	---	---	---	533
238	37	6	100;200	70	10/66	6	.04	12	570	---	534
178	15	6	78;158	110	10/66	2	.03	9	320	---	535
240	66	6	100;210	0	2/66	100	---	---	---	---	536
120	40	6	110;115	50	9/68	10	.17	---	---	---	537
140	113	6	55;119	60	10/72	20	.25	2	100	---	538

Table 17.

Well location						Alti- tude of land surface		
Number	Lat-Long	Owner	Driller	Date completed	Use	(feet)	Topo- graphic setting	Aquifer/ lithology
Da- 539	4010-7640	Edward Snavely	Harrisburg's Kohl Bros.	1973	H	530	H	Trd/db
540	4012-7641	Walter Hoke, Jr.	do.	1969	H	480	S	Trd/db
541	4013-7639	Earl Sassaman	do.	1971	H	635	S	Trg/ss
542	4012-7641	Robert Davenport	do.	1973	H	530	S	Trd/db
543	4014-7642	Michael Niedwick	William Lester Etnoyer	1973	H	385	S	Trg/ss
544	4015-7639	E. R. Lex	Harrisburg's Kohl Bros.	1971	H	670	S	Trg/ss
545	4013-7640	David Hines	do.	1973	H	570	V	Trd/db
546	4014-7641	Robert Zimmerman	William Lester Etnoyer	1973	H	620	S	Trg/ss
547	4014-7641	L. L. Linebaugh	Harrisburg's Kohl Bros.	1972	H	620	S	Trg/ss
548	4014-7639	Stanley Kroll	Kohl Bros., Inc.	1970	H	685	S	Trg/ss
549	4013-7638	G. Laudermilch	Rufus A. Light	1975	H	650	S	Trg/ss
550	4014-7638	Helen O. Snavely Mem. Home	Harrisburg's Kohl Bros.	1958	T	750	H	Trg/ss
551	4015-7639	G. H. Jeffries	do.	1970	H	760	H	Trg/ss
552	4014-7639	Elizabeth Corrado	do.	1971	H	730	H	Trg/ss
553	4015-7639	J. R. Malloy	do.	1972	H	620	S	Trg/ss
554	4015-7640	Michael Miller	do.	1974	H	710	H	Trg/ss
555	4014-7638	J. B. McCorkel, Jr.	do.	1971	H	440	V	Trg/ss
556	4014-7641	Hang Lim	William Lester Etnoyer	1973	H	765	H	Trg/ss
557	4014-7638	Ronald Brennan	do.	1974	H	530	S	Trg/ss
558	4013-7639	Daniel Sadler	Harrisburg's Kohl Bros.	1971	H	695	S	Trg/ss
559	4013-7638	James Linaweaver	William Lester Etnoyer	1974	H	775	S	Trg/ss
560	4013-7638	Ronald Strauss	Harrisburg's Kohl Bros.	1974	H	630	S	Trg/ss
561	4013-7637	Clair Kreider	do.	1971	H	590	S	Trg/ss
562	4011-7637	R. C. Deppen	Rufus A. Light	1967	H	475	S	Trg/ss
563	4014-7636	Stauffer's Mennonite Ch.	Harrisburg's Kohl Bros.	1970	H	495	H	Trg/ss
564	4014-7636	W. H. Gantz	Kohl Bros., Inc.	1971	H	480	S	Trg/ss
565	4014-7636	Caballero Home	do.	1966	C	545	H	Trg/ss
566	4014-7636	Arthur Warren	Harrisburg's Kohl Bros.	1970	H	600	S	Trg/ss
567	4013-7637	Conewago Elem. Sch.	do.	1957	T	570	H	Trg/ss
568	4013-7636	J. W. Quimby	do.	1973	H	505	S	Trd/db
569	4011-7637	O. A. Luttrell	do.	1973	H	500	S	Trd/db
570	4011-7637	J. H. Malvin	H. K. Honberger & Sons	1975	H	520	H	Trd/db
571	4011-7637	Russell Flick	do.	1974	H	455	S	Trd/db
572	4011-7637	P. T. Wolfe	do.	1975	H	480	S	Trd/db
573	4011-7635	Albert Ehrhart	Harrisburg's Kohl Bros.	1959	H	460	S	Trg/ss
574	4012-7636	C. E. Brubaker	do.	1969	H	502	H	Trg/ss
575	4012-7634	Gulf Oil Corp.	do.	1950	C	480	S	Trg/ss
								LANCASTER
Ln- 294	4010-7608	WGSA Radio Station	Myers Bros. Drlg. Cont.	---	H	600	S	Trhc/ss
407	4012-7632	J. R. Hostetter	---	---	H	620	S	Trhc/ss
408	4013-7605	Marcus Martin	Titus Sensenig	1958	H	483	S	Trd/db
412	4013-7605	Howard Johnson's Motel and Restaurant	Robert O. Grant	1958	C	480	S	Trhc/sh
454	4013-7628	United Zion Ch.	Myers Bros. Drlg. Cont.	1956	H	600	S	Trhc/ss
499	4014-7615	Ephrata Diamond Spring Water Co.	do.	1962	B	530	S	Trhc/ss
509	4014-7619	J. D. Snader	H. K. Honberger & Sons	1960	H	535	S	Trhc/ss
510	4014-7619	J. R. Ruhl	do.	1960	H	600	S	Trhc/ss
511	4014-7620	A. M. Yoder	---	1938	H	458	S	Trhc/ss
512	4014-7620	Avid Sherpf	Jacob G. Wentzel, Estate	1956	H	565	S	Trhc/ss
513	4014-7620	Robert Claus	---	1953	H	530	S	Trhc/ss
1180	4010-7609	Ephrata Bor.	---	---	U	600	S	Trhc/ss
1181	4010-7609	do.	---	---	U	600	S	Trhc/ss
1182	4010-7609	do.	---	---	U	600	S	Trhc/ss
1284	4014-7603	Adamstown Water Auth.	Kohl Bros., Inc.	1939	U	710	S	Trhc/ss
1285	4014-7603	do.	do.	1940	P	690	S	Trhc/ss
1286	4014-7603	do.	do.	1951	P	680	S	Trhc/ss
1294	4012-7600	Gulf Oil Corp.	Harrisburg's Kohl Bros.	1950	C	460	V	Trhc/ss
1295	4012-7600	do.	do.	1950	C	460	V	Trhc/ss
1296	4012-7601	do.	do.	1950	C	460	V	Trhc/ss
1297	4009-7603	Terre Hill Bor.	---	1933	P	652	H	Trhc/ss
1298	4009-7603	do.	---	1956	P	440	V	Trhc/ss
1300	4011-7606	East Cocalico Twp. Auth.	Kohl Bros., Inc.	1958	P	596	S	Trhc/ss
1302	4009-7602	Terre Hill Bor.	do.	1974	P	515	S	Trhc/ss
1303	4009-7603	do.	---	1933	P	652	H	Trhc/ss
1304	4014-7604	Adamstown Bor.	Kohl Bros., Inc.	1970	U	650	S	Trhc/ss
1305	4014-7606	Denver Bor.	do.	1972	P	455	S	Trhc/ss
1306	4016-7606	West Cocalico Twp. Auth.	Thomas G. Keyes	1969	P	480	V	Trhc/ss
1307	4013-7604	East Cocalico Twp. Auth.	Robert O. Grant	1960	P	540	S	Trhc/ss
1308	4013-7604	do.	Petersheim Bros.	1962	P	540	S	Trhc/ss
1310	4012-7606	do.	Moody Drilling Co., Inc.	1972	P	490	V	Trhc/ss
1311	4013-7627	Pa. Turnpike	Harrisburg's Kohl Bros.	1950	C	603	S	Trhc/ss
1312	4012-7602	do.	do.	1950	C	550	S	Trhc/sh
1313	4013-7604	Adamstown Sewage Auth.	do.	1965	C	440	V	Trhc/sh

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
180	35	6	80;140	55	8/76	6	.01	10	340	---	Da- 539
240	16	6	238	120	6/69	30	.25	---	---	---	540
100	20	6	50;90	33	11/71	15	.22	8	270	---	541
80	47	6	60;64	20	10/73	20	.33	---	---	---	542
125	84	6	95;120	50	5/73	28	.37	3	125	---	543
185	47	6	60;178	76	9/71	12	.11	2	105	---	544
120	48	6	60;102	20	8/73	6	.06	13	500	---	545
105	44	6	100	60	3/73	10	.22	---	---	---	546
160	50	6	80;140	50	10/72	20	.18	---	70	---	547
216	40	6	51;84;192	75	8/76	4	.03	2	100	---	548
51	40	6	45;47;51	30	5/75	18	---	5	170	---	549
300	64	6	---	150	10/58	30	.34	2	110	---	550
503	471	4	462;482	363	6/70	10	1.4	1	30	---	551
220	40	6	80;160;210	60	12/71	10	.06	---	---	---	552
360	189	6	300;330	300	9/72	25	.42	4	140	---	553
140	50	6	85;133	68	8/76	20	.25	2	90	---	554
100	40	6	58;95	18	2/71	10	.12	2	75	---	555
74	36	6	70	35	3/73	14	.36	---	---	---	556
190	109	6	140;184	93	7/74	22	.23	2	120	---	557
120	90	6	55;100	45	7/71	30	.40	2	80	---	558
115	97	6	110	48	11/74	28	.42	---	---	---	559
140	42	6	80;125	50	4/74	7	.08	1	50	---	560
160	71	6	90;150	46	8/71	20	.14	6	235	---	561
55	40	6	42;48	27	1967	4	.15	10	350	---	562
140	39	6	60;100	35	6/70	30	.29	---	---	---	563
100	69	6	78;91	19	4/71	30	.73	3	145	---	564
160	36	6	83;147;155	71	5/66	15	.17	---	---	---	565
115	50	6	60;100	40	6/70	20	.27	7	270	---	566
200	59	6	---	40	2/57	30	.50	4	190	---	567
60	50	6	45;55	5	4/73	20	.36	6	230	---	568
150	28	6	40	40	8/73	1	.01	---	---	---	569
102	62	6	45;82	25	7/75	20	.36	4	165	---	570
100	100	6	85	24	8/76	20	.57	3	100	---	571
160	70	6	80;135	50	6/75	3	.04	5	165	---	572
133	31	6	117	28	4/59	10	.10	14	460	---	573
170	40	6	150	50	2/69	12	.10	8	300	---	574
475	32	6	---	40	6/50	29	.29	7	---	7.5	575
COUNTY											
96	39	6	---	---	---	20	---	---	---	---	Ln- 294
43	---	60	---	17	5/64	---	---	5	230	---	407
86	28	6	---	---	4/64	10	---	14	400	---	408
200	31	6	58;111	38	7/58	94	1.2	---	---	---	412
110	---	6	---	---	---	---	---	1	125	6.9	454
170	54	6	---	---	---	28	---	---	---	6.3	499
128	---	6	---	66	12/63	12	---	3	155	---	509
---	---	6	---	---	---	5	---	5	215	---	510
96	---	6	---	---	---	---	---	4	225	6.3	511
100	30	6	100	15	1956	---	---	2	85	---	512
235	---	6	---	---	---	---	---	---	---	---	513
201	---	6	---	---	---	15	---	---	---	---	1180
205	---	6	---	---	---	18	---	---	---	---	1181
407	---	6	---	---	---	15	---	---	---	---	1182
400	192	8	---	132	1/39	50	3.8	---	---	---	1284
363	137	8	---	---	---	140	---	---	---	---	1285
425	71	---	---	95	6/51	240	3.2	3	---	6.3	1286
202	69	6	---	31	6/50	80	.7	5	310	6.9	1294
248	44	6	---	45	6/50	96	1.0	---	---	---	1295
250	34	6	---	26	11/50	110	1.5	3	---	6.7	1296
310	---	8	---	149	10/76	30	.15	7	380	6.6	1297
405	140	8	---	40	---	80	---	10	480	7.0	1298
190	32	8	11;27;49;95; 174	3	8/58	60	.7	2	90	7.0	1300
280	42	8	---	10	1/74	110	.58	6	320	6.4	1302
281	245	8	---	---	---	15	---	---	---	---	1303
400	55	8	60;120;180;254	27	5/76	503	5.4	1	---	5.8	1304
305	65	6	---	1	6/72	111	.93	3	---	6.5	1305
300	40	8	---	F	7/70	300	3.1	6	242	7.8	1306
200	48	6	62;98;125;143	40	2/60	75	1.2	9	---	7.6	1307
187	50	6	58;110;150;178	55	7/62	100	.80	9	---	7.6	1308
450	63	8	65;92;185;260; 394	2	1/72	175	1.3	34	1100	7.7	1310
296	33	6	---	20	8/50	25	.46	39	2100	---	1311
292	44	6	---	45	8/50	21	.31	21	950	---	1312
215	42	6	110;123;210	7	10/76	22	.34	11	455	7.6	1313

Table 17.

Well location								
Number	Lat-Long	Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Ln-1314	4008-7641	Gerald Ortity	Myers Bros. Drlg. Cont.	1974	H	500	H	Trd/db
1315	4008-7641	L. W. Hammaker	York Drilling Co., Inc.	1966	H	420	S	Trd/db
1316	4008-7640	T. E. Dolin	do.	1974	H	480	V	Trd/db
1318	4008-7638	Kenneth Kaylor	Myers Bros. Drlg. Cont.	1974	U	590	S	Trd/db
1319	4009-7638	W. D. Forney	Harrisburg's Kohl Bros.	1969	H	470	S	Trg/ss
1320	4009-7638	Agway	Eichelberger Well Drilling	1972	C	395	V	Trg/sh
1321	4009-7638	do.	do.	1972	C	395	V	Trg/sh
1322	4014-7620	Daniel Williams	Myers Bros. Drlg. Cont.	1974	H	480	S	Trhc/ss
1323	4016-7609	Carl Ansel	Robert O. Grant	1975	H	560	S	Trhc/sh
1324	4012-7603	Mrs. Deborah Garner	do.	1975	H	555	S	Trd/db
1325	4015-7613	Martin Musser	Kohl Bros., Inc.	1972	H	905	H	Trhc/ss
1326	4015-7613	James Whitaker	do.	1972	H	870	S	Trhc/ss
1327	4015-7613	Larry Youndt	do.	1974	H	930	H	Trhc/ss
1328	4015-7613	J. H. Royer	Robert O. Grant	1972	H	780	S	Trhc/sh
1329	4014-7609	A. A. Materazzi	do.	1968	H	605	H	Trhc/qzcg
1330	4014-7609	Franklin Knauer, Sr.	do.	1968	H	630	S	Trhc/qzcg
1331	4016-7615	Pa. Game Comm.	Kohl Bros., Inc.	1970	C	565	H	Trhc/ss
1332	4016-7614	do.	do.	1971	H	595	S	Trhc/qzcg
1333	4016-7613	do.	do.	1971	H	580	S	Trhc/qzcg
1334	4016-7613	do.	do.	1971	H	560	V	Trhc/ss
1335	4017-7612	George Burkholder	Robert O. Grant	1966	H	558	V	Trhc/ss
1336	4017-7612	Fred Oinger	do.	1970	H	560	V	Trhc/ss
1337	4016-7611	Daniel Stoner, Sr.	do.	1970	H	482	V	Trhc/sh
1338	4016-7611	G. L. Stegeman	do.	1969	H	480	V	Trhc/sh
1339	4016-7611	R. L. Haldeman	do.	1966	H	485	V	Trhc/sh
1340	4016-7608	Ernest Crouse	do.	1975	H	560	H	Trhc/sh
1341	4015-7608	Dutchland Laboratory Animals	do.	1969	C	490	S	Trhc/sh
1342	4016-7607	W. K. Heinsey	Kohl Bros., Inc.	1957	H	460	V	Trhc/ss
1343	4015-7606	Tom Mawhinney	Robert O. Grant	1969	H	518	S	Trhc/sh
1344	4015-7604	Arlene Gress	do.	1966	H	515	V	Trhc/sh
1345	4016-7605	James Wike	do.	1966	H	690	S	Trhc/ss
1346	4015-7604	P. G. Weaver	do.	1966	H	495	V	Trhc/sh
1347	4016-7605	David Lutz	do.	1967	H	525	S	Trhc/ss
1348	4017-7606	Walter Augsburger	do.	1967	H	580	S	Trhc/sh
1349	4014-7605	Ben Mell	Richard H. Stanley	1975	H	600	S	Trhc/ss
1350	4017-7607	Maurice Ruth	do.	1971	H	870	H	Trhc/qzcg
1351	4016-7607	Pa. Game Comm.	Kohl Bros., Inc.	1956	H	480	V	Trhc/ss
1352	4016-7608	Keystone Nitewear, Inc.	---	1965	N	537	S	Trhc/qzcg
1353	4016-7608	Irvin Zook	Robert O. Grant	1974	H	535	S	Trhc/sh
1354	4015-7608	R. S. Hagy	do.	1967	H	710	H	Trhc/sh
1355	4015-7609	Ernest Schirmer	do.	1969	H	585	S	Trhc/sh
1356	4015-7609	L. H. Hertzog	do.	1970	H	575	S	Trhc/sh
1357	4015-7610	Thomas Stuber	do.	1967	H	600	V	Trhc/sh
1358	4015-7610	David Heinaman	do.	1974	H	625	S	Trhc/sh
1359	4015-7610	I. K. Trout	do.	1974	H	575	S	Trhc/sh
1360	4015-7612	Lloyd Weitzel, Jr.	do.	1967	H	640	S	Trhc/ss
1364	4017-7608	L. R. Miller	do.	1972	H	600	S	Trhc/qzcg
1365	4013-7605	Clyde Bixler	do.	1968	H	550	S	Trhc/sh
1367	4013-7605	Texaco Oil Co.	do.	1967	I	490	S	Trhc/sh
1368	4013-7605	Floyd Sensenig	do.	1966	H	490	S	Trhc/sh
1369	4014-7603	Hope Hosiery Mills	Kohl Bros., Inc.	1967	N	475	V	Trd/db
1370	4013-7600	Larry Geissler	Richard H. Stanley	1969	H	605	S	Trd/db
1371	4012-7601	Amos Zimmerman	Robert O. Grant	1971	H	580	S	Trhc/sh
1372	4012-7606	Lee Rutt	do.	1971	H	500	S	Trhc/sh
1373	4012-7604	E. K. Hanna	Petersheim Bros.	1966	H	445	S	Trhc/ss
1374	4012-7603	L. T. Carbaugh	C. S. Garber & Sons, Inc.	1975	H	550	S	Trd/db
1375	4012-7603	Steven Lutz	Robert O. Grant	1975	H	522	H	Trd/db
1376	4012-7605	G. L. Brubaker	do.	1970	H	480	S	Trhc/sh
1377	4011-7605	James Ludwig	do.	1971	H	475	S	Trhc/sh
1378	4011-7603	Earl Weinhold	do.	1966	H	460	S	Trhc/ss
1379	4010-7603	Fivepointville Hotel	do.	1972	C	460	S	Trhc/sh
1380	4009-7603	W. O. Schlott	C. S. Garber & Sons, Inc.	1973	H	600	S	Trd/db
1381	4009-7603	do.	Kohl Bros., Inc.	1965	U	600	S	Trd/db
1382	4011-7633	M. I. Risser	Myers Bros. Drlg. Cont.	1975	H	480	S	Trhc/ss
1383	4011-7633	J. R. Rittenhouse	do.	1974	H	530	S	Trd/db
1384	4010-7636	Exxon	Kohl Bros., Inc.	1972	C	510	S	Trd/db
1385	4010-7636	VFW Post 5667	Harrisburg's Kohl Bros.	1970	C	580	H	Trd/db
1386	4010-7637	P. M. Engle	do.	1966	H	500	S	Trd/db
1387	4010-7637	Arthur Horst	do.	1966	H	420	S	Trd/db
1388	4013-7627	William Snyder	Myers Bros. Drlg. Cont.	1974	H	615	H	Trhc/ss
1389	4015-7611	Harold Lash	Robert O. Grant	1968	H	830	H	Trhc/sh
1390	4015-7612	William Withers	do.	1974	H	900	H	Trhc/sh
1391	4015-7611	Steven Wilson	do.	1974	H	900	H	Trhc/sh
1392	4015-7611	S. L. Wilson	Myers Bros. Drlg. Cont.	1974	U	900	H	Trhc/qzcg
1393	4010-7608	Ephrata Bor.	---	---	P	459	S	Trhc/ss

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level Depth below land surface (feet)	Static water level Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
70	15	6	31;59;65	---	---	18	---	5	335	---	Ln-1314
100	41	6	70	---	---	6	---	5	280	---	1315
100	22	6	28	10	10/75	4	---	5	275	---	1316
315	28	6	---	---	---	0	---	7	---	---	1318
140	67	6	80;120	45	7/69	20	.21	5	275	---	1319
348	41	6	---	10	2/72	25	.10	5	300	---	1320
205	42	6	---	8	2/72	62	.39	---	---	---	1321
195	41	6	154;190	---	---	50	---	---	---	---	1322
142	62	6	105;118;122	80	5/76	15	.88	2	75	5.6	1323
122	12	6	22;68	10	7/75	5	.04	6	218	6.1	1324
133	123	6	---	50	9/72	9	.11	1	40	5.0	1325
275	185	6	253	82	9/72	4	.02	---	---	---	1326
300	294	4	150;280	235	9/74	10	.25	---	---	---	1327
201	193	6	81;197	60	10/72	5	.03	---	---	---	1328
110	52	6	43;74;108	18	5/68	7	.08	4	150	---	1329
84	40	6	46;57;78	25	5/68	20	.53	7	200	---	1330
200	52	8	56;88;110;162	22	12/70	65	.44	2	100	6.0	1331
170	46	6	68;115	12	10/71	20	1.3	1	---	6.4	1332
200	41	6	62;103;152;164	20	10/71	100	4.0	---	---	---	1333
200	51	6	50;71;84;140;182	20	10/71	75	25	1	---	6.2	1334
59	56	6	32;58	20	8/66	20	1.2	---	---	---	1335
59	29	6	5;23;48	11	10/70	35	1.5	6	250	---	1336
79	43	6	23;57;75	18	8/70	20	.83	4	165	---	1337
82	60	6	25;43;74	14	9/69	45	2.6	3	130	---	1338
66	50	6	28;42;65	10	8/66	40	8.0	---	---	---	1339
137	78	6	77;92;116;125	54	4/75	12	.15	2	90	---	1340
109	38	6	43;88;102	29	10/76	30	1.7	10	400	---	1341
84	39	6	10;60;82	3	11/57	12	1.0	7	260	---	1342
91	36	6	43;72;86	33	8/69	9	.16	10	370	---	1343
87	37	6	39;54;83	20	10/66	15	.32	5	1600	---	1344
156	78	6	101;128;144	74	10/76	30	30	13	500	---	1345
66	42	6	18;31;60	11	10/76	36	2.8	1	55	---	1346
79	39	6	40;71	20	8/67	8	.14	3	140	---	1347
102	44	6	38;68;83;94;99	11	1/67	36	1.2	8	315	---	1348
75	37	6	35;60	6	9/75	30	7.5	5	200	---	1349
208	33	6	163;200	108	5/71	8	.08	---	---	---	1350
135	50	6	12;105	12	11/56	12	.67	---	---	---	1351
155	---	6	---	---	---	---	---	5	195	---	1352
123	41	6	78;92;115	13	10/76	18	.24	16	650	---	1353
234	92	6	98;124;180;202;230	48	4/67	12	.06	---	220	---	1354
86	38	6	38;79	15	7/69	8	.11	3	125	---	1355
86	49	6	42;73	22	5/70	10	.16	---	---	---	1356
108	78	6	47;98	36	10/76	8	.17	3	140	---	1357
203	41	6	162;189;198;201	46	10/76	24	1.0	6	240	---	1358
101	41	6	80	22	4/74	12	.15	---	---	---	1359
151	94	6	105;128;145	50	5/67	10	.10	6	255	---	1360
135	49	6	87;116;124	77	10/72	30	3.8	4	175	---	1364
95	46	6	48;72;89	45	10/68	20	.83	8	300	---	1365
110	40	6	32;68;100	28	10/76	10	.13	11	500	---	1367
86	37	6	47;68;81	18	8/66	20	.43	13	520	---	1368
400	34	6	70;315;327;380	26	1/67	15	.12	32	1300	---	1369
27	26	6	12;25	4	6/69	6	.29	7	300	---	1370
85	42	6	37;76;81	37	9/71	16	.42	5	220	---	1371
93	71	6	28;56;85	2	3/71	30	.42	2	120	---	1372
95	50	6	55;65;78	8	6/66	37	---	3	150	---	1373
140	54	6	57;120	49	8/75	6	.07	---	---	---	1374
48	20	6	32;45	21	10/76	15	.54	11	370	---	1375
89	57	6	38;72;85	12	10/70	30	1.5	4	225	---	1376
97	40	6	52;94	30	4/71	18	.33	9	370	---	1377
109	45	6	42;78;99	58	11/66	20	2.9	---	---	---	1378
137	49	6	92;121;134	63	8/72	30	.56	9	480	---	1379
75	---	6	60;75	20	10/76	60	---	14	480	---	1380
100	26	6	60	24	5/65	3	.04	---	---	---	1381
150	70	6	89;100	---	---	10	---	4	195	---	1382
50	13	6	19;35;38	---	---	15	---	6	230	---	1383
70	41	6	52;65	10	1/72	15	.25	12	440	---	1384
80	32	6	40;60	14	9/76	12	.17	9	330	---	1385
78	38	6	48;68	35	8/66	5	.12	5	200	---	1386
58	13	6	40;50	10	7/66	10	.21	---	---	---	1387
120	82	6	95;110	---	---	30	---	3	95	---	1388
99	37	6	41;88	45	5/68	4	.07	---	---	---	1389
189	97	5	80;128;181	52	7/74	18	.26	4	180	---	1390
202	138	5	98;140	58	10/74	10	.06	---	---	---	1391
122	42	6	75;113	---	---	2	---	---	---	---	1392
139	---	8	---	---	---	---	---	2	80	---	1393

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Ln-1394	4010-7608	Ephrata Bor.	---	---	P	467	S	Trhc/ss
1395	4010-7609	do.	---	---	P	465	S	Trhc/ss
1397	4014-7602	Robert and John Sill	Kerr Bros.	1966	U	570	H	Trd/db
1398	4011-7600	Henry High	Robert O. Grant	1972	H	445	S	Trhc/sh
1399	4012-7600	Catherine Kring	do.	1968	H	500	V	Trhc/ss
1400	4011-7557	C. L. Hughes	Richard H. Stanley	1970	H	840	S	Trhc/sh
1401	4011-7559	Norman Waltz	Robert O. Grant	1969	H	625	S	Trd/db
1402	4010-7555	Jonas Esch	Petersheim Bros.	1967	H	760	S	Trhc/ss
1403	4010-7557	E. M. Nolt	do.	1971	H	790	S	Trhc/ss
1404	4009-7557	Walter Kurtz	do.	1966	H	765	S	Trhc/ss
1405	4016-7608	West Cocalico Twp. Auth.	William Stothoff Co.	1977	P	520	V	Trhc/ss
								LEBANON
Lb- 206	4016-7623	Samuel Wenger	---	---	H	682	S	Trd/db
230	4016-7629	Mrs. C. B. Bowman	---	---	H	580	S	Trd/db
231	4016-7629	Mrs. Catherine Bowman	---	1953	H	630	V	Trhc/ss
338	4017-7618	Nathan Dulebohn	---	---	H	580	S	Trhc/sh
339	4017-7617	Harrison Matz	Kohl Bros., Inc.	1946	H	620	S	Trhc/sh
340	4017-7617	Franklin Wike	---	---	H	580	V	Trhc/sh
412	4017-7617	Heidelberg Water Co.	Kohl Bros., Inc.	1959	P	620	V	Trhc/ss
431	4015-7624	Cornwall Munic. Water Auth.	do.	1955	U	664	S	Trhc/ss
432	4015-7623	do.	do.	1963	P	800	S	Trhc/ss
433	4014-7628	Mt. Gretna Camp Meeting Assoc.	---	1944	P	740	S	Trhc/ss
434	4014-7627	Mt. Gretna Heights Water Co.	---	1922	P	840	S	Trhc/ss
439	4012-7634	Gulf Oil Corp.	Harrisburg's Kohl Bros.	1950	C	490	V	Trhc/ss
440	4012-7634	do.	do.	1950	C	490	V	Trhc/ss
441	4012-7634	do.	do.	1950	C	490	V	Trhc/ss
467	4015-7634	Donald Eddinger	do.	1953	H	665	S	Trhc/ss
493	4015-7627	West Cornwall Twp.	Sprague & Henwood, Inc.	1959	U	720	S	Trhc/ss
612	4016-7622	Mark Heisey	---	---	S	660	S	Trhc/ss
613	4016-7621	Donald Walters	---	---	H	680	V	Trhc/ss
615	4016-7618	Harry Boyer	---	---	H	505	V	Trhc/qzcg
713	4016-7619	Michter's Distillery, Inc.	Kohl Bros., Inc.	1960	N	480	V	Trhc/qzcg
720	4016-7635	H. L. Zeiger	Edwin Gerlach & Sons	1960	H	500	S	Trhc/ss
724	4016-7619	Michter's Distillery, Inc.	Kohl Bros., Inc.	1946	N	490	V	Trhc/qzcg
725	4016-7619	do.	do.	1944	N	495	V	Trhc/qzcg
729	4013-7630	Trinity Lutheran Ch.	---	---	H	500	V	Trhc/ss
788	4017-7617	Heidelberg Water Co.	Kohl Bros., Inc.	1962	P	610	V	Trhc/ss
793	4014-7627	Mt. Gretna Heights Water Co.	do.	1966	P	810	S	Trhc/ss
794	4014-7628	Mt. Gretna Camp Meeting Assoc.	Harrisburg's Kohl Bros.	1967	P	720	S	Trhc/ss
795	4014-7627	Pa. Chautauqua	---	1913	P	845	H	Trhc/qzcg
796	4014-7628	do.	---	1905	P	640	V	Trhc/ss
797	4014-7628	do.	Kohl Bros., Inc.	1966	P	650	S	Trhc/ss
798	4015-7634	Campbelltown Water Co.	do.	1973	P	560	V	Trhc/ss
799	4016-7634	do.	Gassert	---	P	540	S	Trhc/ss
800	4014-7628	Conewago Hills, Inc.	---	1952	P	645	S	Trhc/qzcg
801	4017-7615	G. F. Gingrich	Kohl Bros., Inc.	1966	H	695	S	Trhc/ss
802	4017-7615	W. M. Smith	do.	1969	H	640	S	Trhc/ss
803	4016-7616	Paul Eubanks	do.	1969	H	880	H	Trhc/ss
804	4016-7617	Edwin Stauffer	do.	1968	H	558	V	Trhc/ss
805	4017-7617	Heidelberg Sportsmans Club	do.	1968	C	620	S	Trhc/lscg
806	4016-7618	Louis Spurigo	do.	1970	H	590	H	Trhc/ss
807	4016-7618	Paul Sweigart	do.	1968	H	620	S	Trhc/ss
808	4015-7618	D. J. Beard	do.	1970	H	640	S	Trhc/ss
809	4016-7622	Arlene Krick	Fisher's Well Drilling	1974	H	760	S	Trd/db
810	4017-7614	H. E. Fertig	Kohl Bros., Inc.	1969	H	600	S	Trhc/ss
811	4017-7613	Monroe Lesher	do.	1967	H	780	H	Trhc/ss
812	4015-7623	Robert Groh	do.	1971	H	860	S	Trhc/qzcg
813	4015-7623	Penn Laurel Council, Inc.	do.	1965	H	930	S	Trhc/qzcg
814	4015-7623	Bethlehem Steel	Ridpath and Potter Company	1921	U	690	S	Trhc/ss
816	4015-7626	Gretna Glen	Kohl Bros., Inc.	1973	H	680	S	Trd/db
817	4015-7627	W. E. Haag	do.	1971	H	740	V	Trhc/ss
818	4015-7626	Lamar Stutzman	do.	1967	H	740	S	Trhc/ss
819	4015-7627	M. R. Demlinger, Jr.	do.	1964	H	760	S	Trd/db
820	4015-7627	John Thomas	do.	1969	H	770	S	Trhc/ss
821	4015-7628	A. G. Black	do.	1963	H	740	H	Trhc/ss
822	4015-7629	Walter Elliot	do.	1964	H	620	V	Trhc/ss
823	4015-7628	Ronald Ditzler	do.	1970	H	680	S	Trhc/ss
824	4015-7628	G. W. Zentz	do.	1974	H	650	V	Trhc/ss

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 C)	pH	Well number
91	---	8	---	---	---	---	---	---	---	---	Ln-1394
104	---	8	---	15	9/76	---	---	---	---	---	1395
32	26	6	25;31	17	6/66	15	5.0	---	---	---	1397
104	38	6	48;92;98	60	10/72	6	.14	16	570	---	1398
87	---	6	28;52;80	52	8/68	10	.29	---	---	---	1399
205	25	6	160;195	95	3/70	7	.07	4	160	---	1400
83	38	6	63;80	32	11/69	5	.10	---	---	---	1401
80	52	6	60;70	9	3/77	75	---	2	90	---	1402
183	44	6	70;110	---	---	10	---	2	85	---	1403
215	124	6	109;205	75	---	10	---	3	85	---	1404
299	61	8	38;96;105;168;260	10	4/77	300	5.7	6	---	7.7	1405
COUNTY											
25	---	48	---	19	7/57	---	---	8	350	7.3	Lb- 206
30	---	64	---	23	7/57	---	---	14	600	6.8	230
86	---	6	---	3	7/57	---	---	7	275	7.6	231
12	---	---	---	11	8/57	---	---	12	600	7.6	338
120	19	6	---	70	---	18	---	15	650	7.4	339
30	---	---	---	6	9/57	---	---	9	360	7.5	340
98	55	6	63;72;98	3	9/59	200	13	7	---	8.0	412
415	195	6	---	17	---	147	---	---	---	---	431
360	21	6	120;339	42	11/63	150	.95	3	---	6.5	432
200	---	8	---	---	---	60	---	2	---	6.6	433
165	128	8	---	67	---	25	.3	1	---	7.6	434
806	33	6	---	12	8/50	35	.32	15	---	7.3	439
350	124	6	---	28	9/50	28	.30	---	---	7.3	440
250	21	6	---	21	9/50	45	.50	15	---	7.3	441
111	44	6	---	40	3/53	10	.17	2	100	---	467
151	46	6	70	47	10/59	44	.85	1	---	6.0	493
15	---	---	---	10	8/57	---	---	12	550	---	612
30	---	---	---	26	8/57	---	---	---	200	6.9	613
32	27	6	---	29	8/57	---	---	---	220	---	615
485	60	8	32;67;168;337;445	13	6/60	235	3.1	12	400	---	713
107	60	6	---	---	---	21	---	7	265	6.9	720
345	51	8	80;258	30	8/46	237	---	---	---	---	724
243	18	8	---	12	8/44	240	---	---	---	---	725
100	---	6	---	17	8/63	7	.58	6	240	---	729
110	44	6	50;73;102;106	14	9/62	200	12	7	---	7.9	788
140	88	6	101;123;137	44	4/66	210	42	1	---	6.2	793
210	29	6	17;102;201	6	10/67	87	.93	3	---	7.0	794
261	---	8	---	---	---	20	---	2	40	6.0	795
320	37	8	---	8	11/75	---	---	---	---	---	796
385	41	6	72;140;190;270;320;359	40	10/66	90	.75	2	---	6.4	797
300	64	6	80;93;124;171	6	8/73	167	1.2	5	165	6.8	798
400	---	8	---	---	---	30	---	---	---	---	799
200	---	6	---	60	1967	45	.65	---	---	---	800
100	26	6	49;71	65	10/66	30	2.0	2	50	---	801
58	42	6	47;56	28	12/69	30	1.0	3	175	---	802
280	34	6	209;268;278	140	10/75	60	.52	2	90	---	803
100	27	6	53;71;94	18	1/68	80	.98	5	260	---	804
140	44	6	72;128	38	3/68	40	.39	---	---	---	805
115	41	6	70;80;95	40	9/70	30	.50	6	315	---	806
140	22	6	51;109	47	3/68	15	.16	5	195	---	807
120	42	6	67;114	43	11/70	20	.30	3	135	---	808
301	50	6	176;262	---	---	1	---	---	---	---	809
98	41	6	60;76;93	18	9/69	15	.18	7	300	---	810
280	111	6	273	44	9/67	15	.06	10	325	---	811
158	53	6	84;102;134	45	9/71	45	.43	2	60	---	812
175	52	6	102;145;170	58	5/65	30	1.4	---	---	---	813
731	---	12	---	---	---	66	---	---	---	---	814
360	22	6	142;360	15	11/73	1	.01	6	215	---	816
74	42	6	55;72	35	11/71	30	.77	2	60	---	817
60	35	6	46;54	34	7/67	15	.58	---	---	---	818
220	21	6	80;176	60	9/64	6	.04	---	---	---	819
98	69	6	75;91	46	4/69	100	1.9	2	90	---	820
160	41	6	121;149;153	86	5/69	20	.27	---	---	---	821
75	42	6	55;70	21	5/64	50	1.0	2	60	---	822
140	43	6	80;123;136	48	11/75	30	.39	2	45	---	823
180	42	6	87;118;164	17	5/74	30	.18	5	165	---	824

Table 17.

Well location						Alti-tude of land surface (feet)	Topo-graphic setting	Aquifer/ lithology
Number	Lat-Long	Owner	Oriller	Oate completed	Use			
Lb- 825	4014-7629	Roland Nissley	Kohl Bros., Inc.	1971	H	700	H	Trhc/ss
826	4014-7629	Timber 5ervice Co.	---	1888	P	725	H	Trhc/ss
827	4015-7635	Herman Hartman	Rufus A. Light	1969	H	545	5	Trhc/ss
828	4016-7634	P. W. Heisey	Kohl Bros., Inc.	1973	H	555	5	Trhc/ss
829	4015-7634	Oarwin Heisey	do.	1971	H	560	5	Trhc/qzcg
830	4015-7634	5pring Creek Ch.	Harrisburg's Kohl Bros.	1971	H	675	H	Trhc/ss
B31	4014-7633	Melvin 5iegrist	Kohl 8ros., Inc.	1973	H	560	5	Trd/db
832	4015-7634	Michael Hugendubler	Harrisburg's Kohl 8ros.	1971	H	600	5	Trhc/ss
833	4015-7633	R. M. Theiler	Rufus A. Light	1971	H	575	5	Trhc/ss
834	4015-7633	Henry 5ell	Kohl 8ros., Inc.	196B	H	5B0	5	Trhc/ss
835	4015-7633	8ruce Long	do.	1968	H	580	5	Trhc/ss
836	4015-7632	H. W. 5harr	do.	1967	H	570	V	Trd/db
837	4015-7632	G. C. 8owman, Jr.	do.	1967	H	700	H	Trhc/ss
B38	4016-7631	H. J. Oeck	do.	1967	U	545	5	Trd/db
839	4016-7631	Oeck Acres Camp Ground	do.	1971	C	685	5	Trhc/ss
840	4015-7631	Ivan 8eare	Rufus A. Light	1968	H	740	5	Trhc/qzcg
841	4015-7631	Henry Gilbert	do.	1968	H	760	H	Trhc/ss
842	4015-7635	Mike Mavretic	Harrisburg's Kohl Bros.	1973	H	650	5	Trhc/ss
843	4013-7633	Nevin Kern	Kohl Bros., Inc.	1958	H	460	V	Trhc/sh
844	4013-7634	E. E. Coughenour	do.	1971	H	505	V	Trhc/sh
845	4013-7633	Raymond 5mith	Harrisburg's Kohl 8ros.	1970	H	460	V	Trhc/sh
846	4012-7602	M. H. Geib	Kohl 8ros., Inc.	1960	H	470	5	Trhc/ss
847	4014-7631	Pa. Game Comm.	Harrisburg's Kohl 8ros.	1965	H	500	V	Trhc/ss
B48	4014-7632	Colebrook U. C. C.	Kohl Bros., Inc.	1971	H	540	H	Trhc/sh
849	4015-7631	Camp Kirchenwald	do.	1967	T	600	5	Trhc/ss
850	4016-7631	do.	do.	1975	T	590	5	Trhc/ss
851	4014-7630	Christine 5human	do.	1968	H	535	V	Trhc/ss
852	4014-7630	Frederick Morrisey	do.	1963	H	520	V	Trd/db
853	4015-7630	Norman Oaub	do.	1960	H	650	5	Trhc/qzcg
854	4014-7626	Carlos R. Leffler, Inc.	do.	1972	C	740	5	Trhc/qzcg
855	4014-7626	do.	do.	1962	U	750	H	Trhc/qzcg
								YORK
Yo- 154	4000-7653	Erwin 5eifert	Young 8ros.	1957	H	600	5	Trg/ss
155	4000-7653	William Wolgamouth	do.	1957	H	620	5	Trg/ss
156	4000-7653	5ylvan Peiffer	do.	1957	H	620	5	Trg/ss
157	4000-7654	John Myers	do.	1957	H	470	5	Trg/ss
158	4000-7654	H. A. Myers	do.	1958	H	470	5	Trg/ss
171	4001-7652	Russell Williams	Herman Hake	1961	H	555	5	Trg/ss
172	4001-7652	R. E. Beam	Young Bros.	1961	H	640	H	Trg/sh
173	4001-7652	Robert Oanner	do.	1957	H	640	5	Trg/ss
174	4001-7652	Patrick Oawes	George M. 8rillhart	1959	C	540	5	Trg/sh
178	4002-7649	Russell Hollinger	Young 8ros.	1958	H	700	5	Trg/ss
179	4002-7652	Russell 8lank	---	1940	H	625	5	Trg/ss
1B7	4003-7649	Elmer Alloway	Young 8ros.	1957	H	520	5	Trg/ss
190	4004-7646	Wilbur Nichols	do.	1957	H	450	V	Trg/sh
207	4006-7643	Ben 5prenkle	A. C. Reider & 5on, Inc.	1959	H	430	5	Trd/db
300	4003-7703	Joseph Koscevic	---	---	U	545	V	Trg/sh
548	4005-7653	Oept. of Environmental Resources	---	---	H	645	H	Trg/sh
549	4005-7653	do.	---	---	H	610	5	Trg/sh
550	4004-7654	do.	---	---	H	490	5	Trd/db
551	4004-7656	Mr. Oller	---	---	H	625	H	Trg/ss
552	4004-7654	Mr. Harlacker	---	---	H	490	V	Trd/db
553	4004-7654	5tanley Yost	---	---	H	490	V	Trd/db
554	4003-7654	Oept. of Environmental Resources	---	---	U	505	5	Trd/db
555	4004-7652	do.	---	---	U	500	5	Trd/db
556	4005-7652	do.	---	---	H	450	5	Trd/db
557	4005-7653	Homer Hill	---	---	H	660	5	Trg/sh
558	4006-7652	Kenneth Knobb	---	---	H	640	5	Trg/sh
559	4006-7652	George Outrey	---	---	H	710	5	Trg/ss
643	4012-7650	Pa. Turnpike Comm.	Harrisburg's Kohl 8ros.	1950	C	350	5	Trg/ss
730	4006-7652	George Outrey	---	---	U	710	5	Trg/ss
731	4005-7654	L. E. Moody	---	---	H	720	5	Trg/ss
732	4004-7654	Robert Nelson	York Orilling Co., Inc.	1964	H	660	V	Trd/db
733	4004-7655	Hollandsworth	---	---	U	530	H	Trd/db
734	4004-7655	Morton Kise	---	---	H	530	H	Trd/db
735	4005-7655	Henry Cutlip	---	---	H	655	5	Trd/db
736	4005-7655	do.	---	---	U	655	5	Trd/db
737	4005-7656	Charles Myers	---	---	H	540	V	Trd/db
738	4005-7657	Pa. Game Comm.	---	---	H	660	5	Trd/db
739	4005-7657	James 5mee	---	---	H	690	5	Trd/db
740	4004-7657	Lester Hoffman	York Orilling Co., Inc.	1962	H	685	H	Trd/db
741	4004-7657	do.	---	---	U	685	H	Trd/db
742	4003-7653	Louisa Euler	---	---	H	490	V	Trd/db
743	4004-7655	Roy Firestone	---	---	H	500	V	Trd/db
744	4005-7657	Pa. Game Comm.	---	---	U	650	5	Trd/db
745	4006-7654	J. O. Maclay	---	---	U	790	5	Trd/db
746	4006-7654	do.	---	1968	U	790	5	Trd/db

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25°C)	pH	Well number
220	62	6	178;196;210	85	6/71	30	.26	4	130	---	Lb- 825
800	---	8	---	102	11/75	22	1.6	---	160	---	826
133	81	6	90;129	56	3/69	10	.16	1	40	---	827
135	42	6	54;72;110	35	9/76	30	.33	4	210	---	828
120	42	6	61;106	47	3/71	20	.27	---	---	---	829
100	60	6	70;90	55	11/71	15	.33	3	115	---	830
195	41	6	52;116;154;170	41	9/76	8	.05	5	215	---	831
90	40	6	60;80	25	11/71	15	.23	---	---	---	832
78	48	6	58;72;77	20	3/71	20	.53	11	450	---	833
100	30	6	43;61;89	16	10/68	40	.53	2	90	---	834
75	41	6	46;52,68	1	6/68	50	.73	---	---	---	835
200	29	6	40;155	95	9/67	2	.01	5	250	---	836
158	51	6	55;80;110;150	50	9/67	30	.30	1	55	---	837
300	21	6	210	4	9/76	5	.02	---	---	---	838
100	52	6	59;88	34	8/71	60	1.1	2	75	---	839
67	60	6	40;54;67	37	5/68	15	---	5	280	---	840
66	61	6	61	50	7/68	12	---	---	---	---	841
120	63	6	63	35	5/73	10	.12	---	---	---	842
95	21	6	40;70;95	8	7/58	40	1.2	16	600	---	843
100	30	6	52;91	30	9/76	15	.22	12	440	---	844
160	26	6	60;120	19	9/76	18	.14	18	730	---	845
225	27	6	106;210;222	22	8/60	20	.53	10	440	---	846
100	60	6	75;95	13	9/76	15	---	---	---	---	847
160	21	6	121;134;147	52	8/71	30	.28	16	640	---	848
200	46	6	52;70;140;180	49	9/76	60	38	2	100	---	849
120	42	6	73;101	31	9/76	60	.58	2	95	---	850
100	45	6	79;83	22	3/68	15	.19	11	600	---	851
97	36	6	48;96	14	9/63	40	.61	---	---	---	852
79	36	6	62;76	22	8/60	30	1.7	2	160	---	853
100	22	6	52;79	8	5/72	100	1.1	2	90	---	854
133	35	6	63;80;130	35	4/62	20	.27	---	---	---	855
COUNTY											
143	21	6	59;140	59	8/57	7	---	---	---	---	Yo- 154
128	20	6	78;123	51	7/57	---	---	---	---	---	155
228	28	6	140;218;225	130	11/57	8	---	---	---	---	156
120	23	6	81;110;117	40	6/57	4	---	8	380	7.6	157
130	17	6	52	46	7/58	10	---	---	---	---	158
126	28	6	---	34	5/61	---	.1	6	225	7.8	171
109	36	6	---	---	---	15	---	---	---	---	172
196	30	6	91;190;194	65	10/57	10	---	7	195	6.3	173
118	27	6	60;115	53	5/59	10	---	9	380	---	174
112	18	6	60	---	---	8	---	1	62	6.0	178
86	---	6	---	---	---	---	---	3	135	5.8	179
110	24	6	54;68	20	9/57	2	---	4	180	6.8	187
132	26	6	70;122	49	10/57	7	---	10	390	7.3	190
60	12	6	33	23	3/59	9	---	10	435	7.1	207
49	20	6	---	12	5/68	7	1.0	11	400	---	300
120	20	6	---	59	3/68	---	---	14	470	---	548
196	16	6	---	56	3/68	8	---	12	400	---	549
172	29	6	---	---	---	---	---	10	470	---	550
25	---	6	---	---	---	---	---	7	265	7.1	551
6	---	---	---	---	---	---	---	11	400	---	552
27	---	6	---	---	---	---	---	8	285	6.7	553
7	---	---	---	3	---	---	---	10	300	6.9	554
145	---	6	---	7	4/68	---	---	11	420	7.4	555
139	10	6	---	---	---	---	---	18	580	6.9	556
22	---	---	---	12	4/68	---	---	3	135	6.2	557
20	---	---	---	3	4/68	---	---	3	155	6.2	558
100	---	6	---	---	---	---	---	---	360	6.9	559
410	114	6	---	36	6/70	15	.12	11	620	7.1	643
16	---	---	---	4	6/68	---	---	---	200	---	730
15	---	---	---	5	4/68	---	---	---	400	6.6	731
220	---	6	---	---	---	6	---	---	270	6.9	732
22	---	---	---	6	4/68	---	---	---	570	---	733
---	---	---	---	---	---	---	---	---	380	6.8	734
120	18	6	---	---	---	---	---	8	290	8.0	735
18	---	---	---	10	---	---	---	---	355	---	736
20	---	---	---	7	4/68	---	---	5	200	7.9	737
13	---	---	---	7	4/68	---	---	11	385	7.0	738
20	---	---	---	7	4/68	---	---	---	300	---	739
122	24	6	---	---	---	---	---	10	400	7.2	740
18	---	---	---	11	4/68	---	---	---	425	7.4	741
12	---	---	---	---	---	---	---	11	380	---	742
---	---	---	---	---	---	---	---	---	520	---	743
12	---	---	---	12	6/68	---	---	---	320	---	744
20	---	---	---	18	6/68	---	---	---	170	---	745
200	16	6	---	---	---	1	---	---	180	---	746

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Yo- 747	4006-7655	Lee Moyer	---	---	U	870	S	Trd/db
748	4005-7656	Edward Keiser	---	---	H	610	H	Trd/db
749	4005-7654	---	---	---	---	530	S	Trd/db
750	4004-7654	---	---	---	---	480	V	Trd/db
751	4004-7655	Elmo Fleming	---	---	H	500	S	Trd/db
752	4004-7655	Ralph Arnold	---	1965	H	500	S	Trd/db
753	4005-7656	Kenneth Dahlhammer	---	---	H	500	V	Trd/db
754	4005-7656	J. O. Eastlack	Eichelberger Well Drilling	1961	H	580	S	Trd/db
755	4004-7656	C. T. Seifert	---	---	H	510	V	Trd/db
756	4006-7656	C. W. Frey	---	---	H	670	S	Trd/db
757	4006-7656	do.	---	---	U	670	S	Trd/db
758	4005-7653	William Anderson	---	---	H	530	S	Trd/db
816	4010-7649	Donald Lambert	---	---	H	460	S	Trg/sh
817	4010-7649	Frederick Wolf	---	---	C	460	S	Trg/sh
818	4006-7702	Hershey Creamery Co.	---	---	U	550	V	Trg/lscg
819	4006-7702	do.	---	---	U	550	V	Trg/lscg
821	4009-7648	Clara Poticher	Harrisburg's Kohl Bros.	---	H	480	H	Trg/ss
822	4009-7647	Newberry Water Co.	Eichelberger Well Drilling	1968	P	440	V	Trg/sh
823	4009-7647	do.	do.	1970	P	420	V	Trg/sh
824	4009-7647	do.	do.	1973	P	378	V	Trg/sh
825	4009-7648	do.	do.	1970	P	405	V	Trg/ss
826	4011-7650	Red Land Water Co.	---	1955	P	718	H	Trg/ss
827	4011-7650	do.	Herman Hake	1961	P	725	H	Trg/ss
834	4005-7657	Pa. Game Comm.	---	---	H	630	S	Trd/db
835	4005-7657	do.	---	1963	H	630	S	Trd/db
836	4005-7657	Hubert Michael	---	---	H	610	S	Trd/db
837	4005-7657	Robert Knisley	---	---	H	605	S	Trd/db
839	4012-7654	Joseph Martin	---	---	H	420	S	Trg/ss
842	4012-7650	New Cumberland Army Depot	Eichelberger Well Drilling	1972	U	340	V	Trg/sh
844	4012-7650	do.	do.	1972	P	370	V	Trg/sh
845	4012-7651	do.	Harrisburg's Kohl Bros.	1942	U	520	S	Trg/sh
846	4012-7651	do.	do.	1942	U	520	S	Trg/sh
847	4003-7656	Wellsville Fire Co. No. 1	do.	1909	U	500	S	Trg/sh
849	4008-7649	Lester Miller	do.	1973	U	620	S	Trg/ss
850	4008-7649	do.	do.	1974	H	618	S	Trg/ss
851	4010-7650	Berg Electronics	Eichelberger Well Drilling	1971	N	542	S	Trg/ss
852	4010-7650	do.	do.	---	N	542	S	Trg/ss
853	4010-7650	do.	---	---	N	550	S	Trg/ss
854	4010-7650	Gulf Oil Co.	Eichelberger Well Drilling	1971	C	530	V	Trg/ss
855	4010-7650	Thomas Reed	John Thran	1975	H	570	S	Trg/sh
856	4010-7650	M. L. Moore	Harrisburg's Kohl Bros.	1971	H	570	S	Trg/sh
857	4010-7650	Hagy Amusements Inc.	do.	1966	C	520	V	Trg/ss
858	4011-7651	Margaret Reed	---	---	U	770	S	Trg/ss
859	4011-7651	do.	Harrisburg's Kohl Bros.	1974	H	770	S	Trg/ss
860	4011-7649	J. L. Popp	do.	1969	H	650	S	Trg/ss
861	4011-7649	John Dohner	do.	1973	H	720	S	Trg/ss
862	4011-7650	George Hasko	do.	1966	H	645	H	Trg/ss
863	4010-7651	F. W. Dillen	York Drilling Co., Inc.	1967	H	725	S	Trg/sh
864	4009-7649	Redland Motor Inn	Harrisburg's Kohl Bros.	1967	C	500	H	Trg/sh
865	4009-7649	A. G. Mauro Co.	York Drilling Co., Inc.	1974	H	470	V	Trg/sh
866	4009-7651	H. C. Riffey, Sr.	Harrisburg's Kohl Bros.	1967	H	755	H	Trd/db
867	4010-7647	Steven Dormuth	do.	1973	H	610	S	Trg/ss
868	4010-7647	Michael Yocum	do.	1974	H	700	S	Trg/ss
869	4010-7648	Allen Dormuth	do.	1968	H	620	S	Trg/ss
870	4010-7648	Will Niederreither	Eichelberger Well Drilling	1974	H	505	H	Trg/sh
871	4008-7646	J. R. Bowers	Harrisburg's Kohl Bros.	1974	H	500	S	Trg/sh
872	4007-7647	Melvin Burley	do.	1974	H	540	S	Trg/ss
873	4007-7647	Anders	A. C. Reider & Son, Inc.	1972	C	540	H	Trd/db
874	4007-7647	L. W. Guistwhite	York Drilling Co., Inc.	1966	H	580	S	Trd/db
875	4006-7649	Midway Speedway	Harrisburg's Kohl Bros.	1972	C	555	H	Trg/ss
876	4006-7650	Ralph Hughes, Jr.	do.	1967	H	480	S	Trg/sh
877	4008-7651	James Smith	do.	1975	H	860	H	Trg/ss
878	4008-7651	R. C. Pelton	do.	1974	C	435	V	Trg/sh
879	4008-7651	Charles Haring	do.	1967	H	435	S	Trg/ss
880	4007-7650	Henry Brenner	York Drilling Co., Inc.	1966	H	405	V	Trg/sh
881	4006-7651	Albert Staples	Harrisburg's Kohl Bros.	1967	H	595	V	Trd/db
882	4007-7651	Ronald Holtry	Paul E. Kohler	1973	H	440	S	Trg/sh
883	4009-7650	W. R. Coup	Harrisburg's Kohl Bros.	1972	H	550	S	Trg/ss
884	4007-7647	J. O. Ziegler	Young Bros.	1968	H	640	H	Trg/ss
885	4007-7649	J. E. Plasic	Harrisburg's Kohl Bros.	1968	H	420	S	Trg/ss
886	4007-7647	Lewis Fogle	do.	1972	H	650	H	Trg/ss
887	4008-7645	W. O. Wilkinson	Eichelberger Well Drilling	1975	H	500	S	Trg/sh
888	4009-7645	Edward Richards	do.	1974	H	310	V	Trg/sh

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gpm)	Specific capacity (gpm/ft)	Hard-ness (gpg)	Specific conduc-tance (micro-mhos at 25°C)	pH	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
20	---	---	---	---	---	---	---	---	95	---	Yo- 747
137	7	6	---	10	7/68	---	---	---	670	6.7	748
---	---	---	---	---	---	---	---	---	190	---	749
16	---	---	---	14	1/69	---	---	---	330	---	750
25	---	---	---	---	---	---	---	---	390	---	751
138	14	6	---	---	---	4	---	---	225	---	752
21	---	---	---	---	---	---	---	---	360	---	753
165	8	---	---	10	---	---	---	---	220	---	754
10	---	---	---	---	---	---	---	---	315	---	755
70	---	6	---	---	---	---	---	---	340	---	756
25	---	---	---	---	---	---	---	---	340	---	757
12	---	---	---	---	---	---	---	---	290	---	758
56	---	6	---	20	---	5	---	2	---	---	816
80	---	6	---	16	6/76	3	---	3	175	---	817
200	---	6	---	---	---	50	---	---	---	---	818
300	---	6	---	---	---	10	---	---	---	---	819
148	---	6	---	35	---	10	---	6	340	---	821
510	75	4	83;295;365	10	5/68	22	.30	8	---	7.6	822
310	41	6	---	30	6/73	22	.13	7	---	7.7	823
307	42	6	141;188	F	9/73	20	.24	9	---	7.5	824
310	41	6	---	30	6/70	20	.29	7	295	7.7	825
113	88	6	---	60	1955	60	1.5	5	---	6.8	826
180	155	6	---	76	7/61	60	2.1	3	---	7.2	827
28	---	6	---	---	---	---	---	---	3600	---	834
27	27	6	---	---	---	---	---	29	1250	---	835
---	---	6	---	---	---	---	---	---	285	---	836
---	---	6	---	---	---	---	---	---	287	---	837
80	---	6	---	---	---	---	---	---	370	7.0	839
400	41	6	---	28	4/75	25	---	---	---	---	842
700	42	8	---	26	6/76	40	---	---	---	---	844
397	---	---	---	---	---	30	---	---	---	---	845
711	---	---	---	---	---	18	---	---	---	---	846
700	500	6	---	10	1960	32	.06	---	---	---	847
120	70	6	80;95	40	7/73	15	.19	---	---	---	849
160	110	6	115;130;140	80	1/74	20	.25	1	30	5.9	850
82	41	6	---	---	---	15	---	7	280	6.8	851
103	40	6	---	8	6/76	60	---	---	---	---	852
58	58	6	---	---	---	50	---	---	---	---	853
120	60	6	85;112	22	2/71	30	.41	5	180	---	854
100	80	6	90	---	---	20	---	---	---	---	855
120	60	6	85;105	30	11/71	20	.22	---	---	---	856
81	28	6	39;69	10	10/66	35	.49	7	255	---	857
130	---	6	---	55	6/74	12	.32	---	---	---	858
120	35	6	60;105	70	8/74	20	.40	9	380	---	859
278	49	6	125;258	91	6/76	35	.20	4	155	6.4	860
400	29	6	200	150	---	4	.02	3	130	---	861
115	76	6	93;107	68	6/66	9	.28	---	---	---	862
150	122	6	131	---	---	30	---	4	140	---	863
240	37	6	120;210	60	4/67	30	.17	13	500	---	864
115	51	6	100	8	6/76	8	---	7	260	---	865
98	17	6	19	11	3/67	1	.01	7	310	---	866
100	23	6	60;80	65	7/73	3	.09	4	165	---	867
370	79	6	90	85	11/74	1	.01	3	110	---	868
200	27	6	40;170	30	6/68	2	.01	3	115	---	869
225	62	6	155;174;227	57	6/76	6	---	7	280	---	870
200	42	6	105;190	55	6/76	12	.08	7	255	---	871
120	104	6	50;110	38	6/76	20	.25	4	165	---	872
80	60	6	69	15	1/72	20	.32	---	---	---	873
102	18	6	80	---	---	6	---	9	550	---	874
140	50	6	80;120	30	6/74	12	.15	4	220	---	875
220	35	6	110;210	40	6/67	7	.04	7	260	---	876
160	42	6	60;150	40	6/76	30	.25	9	335	---	877
180	69	6	99;168	45	3/74	6	.04	---	---	---	878
161	33	6	49;152	25	4/67	10	.07	14	610	---	879
100	17	6	80	---	---	10	---	7	310	---	880
111	12	6	41;108	54	2/67	2	.04	---	---	---	881
95	12	6	60;80	28	7/75	7	---	12	450	---	882
300	34	6	240;280	100	10/72	6	.03	11	400	---	883
167	64	6	88;163	---	---	6	---	5	290	---	884
140	40	6	55;130	40	7/68	75	1.2	9	400	---	885
320	60	6	100;290	80	8/72	5	.02	---	---	---	886
164	44	6	102;121;144	30	6/76	---	---	7	260	---	887
266	45	6	71;164;247	24	6/76	8	---	9	400	---	888

Table 17.

Well location		Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Yo- 889	4011-7647	Harvey Prowell	Harrisburg's Kohl Bros.	1969	H	820	H	Trg/ss
890	4010-7645	Martin Culver	John Thran	1966	H	440	V	Trg/ss
891	4007-7645	C. E. Markley	York Drilling Co., Inc.	1973	H	530	H	Trd/db
892	4006-7645	H. G. Householder	do.	1973	H	380	S	Trg/sh
894	4007-7645	F. E. Sanger	do.	1974	H	545	H	Trd/db
895	4007-7644	Leverne Boyer	Eichelberger Well Drilling	1975	H	440	S	Trd/db
896	4007-7646	A. R. Best	Harrisburg's Kohl Bros.	1974	I	540	S	Trd/db
897	4007-7644	Carl Guyer	York Drilling Co., Inc.	1973	H	460	H	Trd/db
898	4007-7645	Lloyd Schurtz	Harrisburg's Kohl Bros.	1975	U	510	S	Trd/db
899	4007-7646	Donald Schurtz	do.	1975	H	570	S	Trd/db
900	4007-7646	Terry Byers	Eichelberger Well Drilling	1974	H	635	S	Trd/db
901	4007-7646	Dennis Vaughn	do.	1974	H	630	S	Trd/db
902	4006-7650	Ray Kennedy	Harrisburg's Kohl Bros.	1973	H	450	S	Trg/ss
903	4007-7647	C. E. Ort	Young Bros.	1974	H	595	V	Trg/ss
904	4007-7646	P. E. Beible	Eichelberger Well Drilling	1975	H	655	S	Trg/sh
905	4005-7646	P. C. Deardorff	York Drilling Co., Inc.	1973	H	540	H	Trg/sh
906	4005-7646	Norman Fetrow	Young Bros.	1974	H	520	S	Trg/ss
907	4004-7647	Austin Shue	do.	1975	H	495	S	Trg/ss
908	4004-7648	WRHY	do.	1971	H	925	S	Trg/ss
909	4005-7648	Charles Smith	Leon K. Sunday	1974	H	605	H	Trg/sh
910	4003-7649	C. M. Berkheimer	Young Bros.	1973	H	520	V	Trg/ss
911	4002-7650	G. L. Shellenberger	do.	1971	H	605	H	Trg/sh
912	4003-7648	Curtis Knaub	do.	1974	H	455	V	Trg/ss
913	4002-7650	R. R. Lewellen	do.	1974	C	560	V	Trg/ss
914	4002-7651	Ralph Bathurst	do.	1971	H	615	S	Trg/ss
915	4003-7652	Samuel Runkle	do.	1974	H	500	H	Trg/ss
916	4003-7651	Greg March	do.	1973	H	565	H	Trg/ss
917	4003-7650	Elmer Duttera	do.	1971	H	860	S	Trg/ss
918	4004-7650	Vincent Crone	do.	1973	H	595	S	Trg/ss
919	4003-7651	M. E. Wilson	do.	1970	H	390	S	Trg/ss
920	4005-7651	R. A. Garretson	York Drilling Co., Inc.	1973	H	480	S	Trg/sh
921	4005-7651	Lee Crow	do.	1973	H	535	S	Trd/db
922	4006-7652	Edith Peck	Harrisburg's Kohl Bros.	1972	H	630	V	Trg/sh
923	4006-7651	L. W. Grissinger	do.	1968	H	620	V	Trd/db
924	4007-7652	Clarence Blake	do.	1966	H	620	H	Trg/ss
925	4011-7653	Fairview Sch.	York Drilling Co., Inc.	1962	T	620	H	Trd/db
926	4011-7653	Fairview Twp.	Harrisburg's Kohl Bros.	1971	H	560	S	Trg/qzcg
927	4012-7653	Gordon Kaltrider	do.	1971	H	550	S	Trd/db
928	4011-7653	B. L. Schofield	do.	1974	H	550	V	Trd/db
930	4012-7653	Robert Pletz	do.	1968	H	570	S	Trg/ss
931	4010-7652	Richard Stinson	do.	1971	H	755	V	Trd/db
932	4010-7652	Orion Clouser	do.	1975	H	745	S	Trg/ss
933	4009-7651	Dale Faught	do.	1974	H	755	H	Trd/db
934	4009-7651	S. G. Hughes, Jr.	do.	1973	H	750	H	Trd/db
935	4010-7653	Mt. Zion Elem. Sch.	do.	1954	T	530	V	Trg/lscg
936	4009-7653	John Bricker	do.	1973	H	540	V	Trg/ss
937	4010-7653	Edward Rabena	do.	1973	H	470	S	Trg/ss
938	4011-7626	George Musico	York Drilling Co., Inc.	1966	H	820	V	Trg/ss
939	4009-7653	N. Dellinger	do.	1966	H	540	V	Trg/sh
940	4010-7652	R. L. Taylor	Harrisburg's Kohl Bros.	1970	H	720	S	Trd/db
941	4008-7654	F. A. Trout	do.	1969	H	805	H	Trg/ss
942	4005-7704	S. G. Diamond	Eichelberger Well Drilling	1972	P	790	S	Trd/db
943	4004-7703	Pa. Dept. of Trans.	Harrisburg's Kohl Bros.	1964	H	700	S	Trd/db
944	4007-7701	Bell's Ceramic Arts	Eichelberger Well Drilling	1976	C	560	S	Trg/ss
945	4004-7705	Ernest Myers	Harrisburg's Kohl Bros.	1969	H	670	S	Trg/ss
946	4005-7703	Robert Jodlowski	Eichelberger Well Drilling	1973	H	700	H	Trg/ss
947	4008-7658	Monaghan Twp. Fire Co.	John Thran	1976	C	620	S	Trg/ss
948	4005-7703	Robert Eichelberger	Eichelberger Well Drilling	1975	H	650	V	Trg/lscg
950	4010-7654	Jack Fowler	do.	1976	H	490	S	Trg/lscg
951	4008-7657	James Foltz	do.	1976	H	740	S	Trg/sh
952	4008-7659	J. K. Walton	John Thran	1976	H	585	S	Trg/ss
953	4003-7701	Wilbur Stough	do.	1974	H	675	S	Trg/ss
954	4002-7701	Arthur Kimmel	Young Bros.	1969	H	485	V	Trg/ss
955	4002-7702	Carl Wampler	Harrisburg's Kohl Bros.	1971	U	555	V	Trg/ss
956	4005-7700	R. R. Rutter	John Thran	1966	H	608	V	Trd/db
957	4006-7700	James Robert	York Drilling Co., Inc.	1966	H	565	V	Trg/sh
958	4004-7702	Allison Mayhew	do.	1966	H	720	H	Trg/ss
959	4008-7658	Florence Wolf	do.	1973	H	620	V	Trd/db
960	4008-7657	C. S. Freeburn	do.	1972	H	700	S	Trd/db
961	4008-7658	J. C. Hammond	do.	1972	H	598	S	Trd/db
962	4008-7658	W. B. Eichelberger	do.	1966	H	600	H	Trd/db
963	4008-7658	R. E. Lehman	do.	1966	S	630	S	Trd/db
964	4008-7658	R. L. Messimer	do.	1966	H	600	H	Trd/db
965	4008-7657	R. G. Campbell	do.	1966	H	700	V	Trd/db

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level Depth below land surface (feet)	Static water level Date measured (mo/yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25°C)	pH	Well number
395	37	6	80;345	295	6/69	18	.18	4	220	---	889
80	52	6	60;72;78	50	7/66	20	2.0	3	105	---	890
77	45	6	65	---	---	6	---	5	180	---	891
152	78	6	135	---	---	6	---	4	175	---	892
127	31	6	107	---	---	15	---	7	260	---	894
100	67	6	88;179	---	---	8	---	47	1300	---	895
70	22	6	28;63	15	5/74	5	.09	5	210	---	896
102	21	6	---	---	---	6	---	10	430	---	897
180	35	6	60;70	60	4/75	2	.02	---	---	---	898
400	24	6	30	35	4/75	1	.01	4	180	---	899
133	34	6	83;94;123	---	---	20	---	---	---	---	900
143	35	6	---	---	---	12	---	7	280	---	901
220	29	6	130;198	34	7/73	15	.08	---	---	---	902
96	52	6	69;82	---	---	25	---	---	---	---	903
345	27	6	339	---	---	20	---	5	195	---	904
125	38	6	90	---	---	6	---	4	150	---	905
187	42	6	146;185	74	7/76	5	---	8	280	---	906
126	35	6	60;95	63	7/76	5	---	3	135	---	907
332	25	6	192;314	---	---	5	---	4	195	---	908
250	40	6	140;240	100	7/74	10	---	7	235	---	909
101	22	6	90	---	---	15	---	8	260	---	910
84	20	6	41	37	7/76	10	---	4	180	---	911
105	20	6	47;63	---	---	6	---	6	240	---	912
187	41	6	64;178	---	---	11	---	5	205	---	913
228	23	6	44;163;214	---	---	4	---	7	270	---	914
157	30	6	148	---	---	15	---	9	320	---	915
248	27	6	207	65	---	2	---	7	240	---	916
371	29	6	60	159	7/76	2	---	5	195	---	917
147	20	6	60;114;137	26	7/76	8	---	7	220	6.6	918
187	40	6	102;171	35	7/76	4	---	2	115	---	919
292	18	6	---	---	---	4	---	9	310	---	920
407	20	6	---	---	---	---	---	---	---	---	921
280	30	6	250;270	105	9/72	12	.07	17	600	---	922
160	20	6	55	50	9/68	4	.04	8	325	---	923
220	36	6	120;210	85	8/66	12	.09	6	200	---	924
257	---	6	---	90	7/76	30	---	9	360	---	925
120	47	6	28;60	35	10/71	28	.39	11	380	7.0	926
80	36	6	50;70	18	10/71	25	.40	8	330	---	927
100	29	6	39;66	10	2/74	12	.13	11	430	---	928
160	40	6	80;140	12	7/76	7	.05	10	365	---	930
85	23	6	60;75	10	9/71	10	.13	11	470	---	931
120	32	6	45;75	28	5/75	5	.05	9	360	---	932
200	57	6	60	60	11/74	1	.01	---	---	---	933
145	28	6	40;140	60	9/73	10	.12	---	---	---	934
196	183	6	---	111	1/54	25	.34	8	260	6.9	935
65	54	6	30;60	10	5/73	10	.18	3	125	---	936
300	128	6	140;250	89	7/76	10	.05	---	---	---	937
205	53	6	75	---	---	0	---	6	200	---	938
60	18	6	36	---	---	60	---	13	440	---	939
300	27	6	12	---	---	0	.01	---	335	---	940
160	40	6	150	93	7/76	12	.20	2	80	---	941
205	50	6	---	---	---	35	---	7	220	---	942
314	25	6	---	40	8/64	1	---	8	430	---	943
300	---	6	---	16	7/76	5	.02	8	360	---	944
200	65	6	170;182	0	2/69	20	.13	---	---	---	945
451	20	6	---	---	---	6	---	10	365	---	946
419	40	6	---	---	---	150	.5	---	---	---	947
817	42	6	---	---	---	1	---	---	---	---	948
175	81	6	---	---	---	9	---	---	---	---	950
725	---	6	---	---	---	2	---	---	---	---	951
900	40	6	---	95	7/76	5	---	7	235	---	952
400	42	6	---	85	7/76	2	---	9	320	---	953
111	25	6	55;84;107	21	7/76	25	---	10	380	---	954
485	40	6	205;220;330;340;415;460	64	1/71	20	.12	---	---	---	955
50	15	6	25;32;40	10	7/66	8	.27	11	380	---	956
245	17	6	167	---	---	1	---	4	185	---	957
197	14	6	125;165	---	---	5	---	---	202	5.6	958
202	28	6	---	---	---	6	---	---	---	---	959
250	19	6	242	---	---	1	---	4	145	---	960
200	70	6	110	---	---	1	---	7	310	---	961
340	12	6	300	---	---	1	---	---	---	---	962
255	23	6	30;170	30	7/66	1	---	7	350	---	963
390	16	6	---	---	---	0	---	2	210	---	964
200	18	6	105	---	---	1	---	---	---	---	965

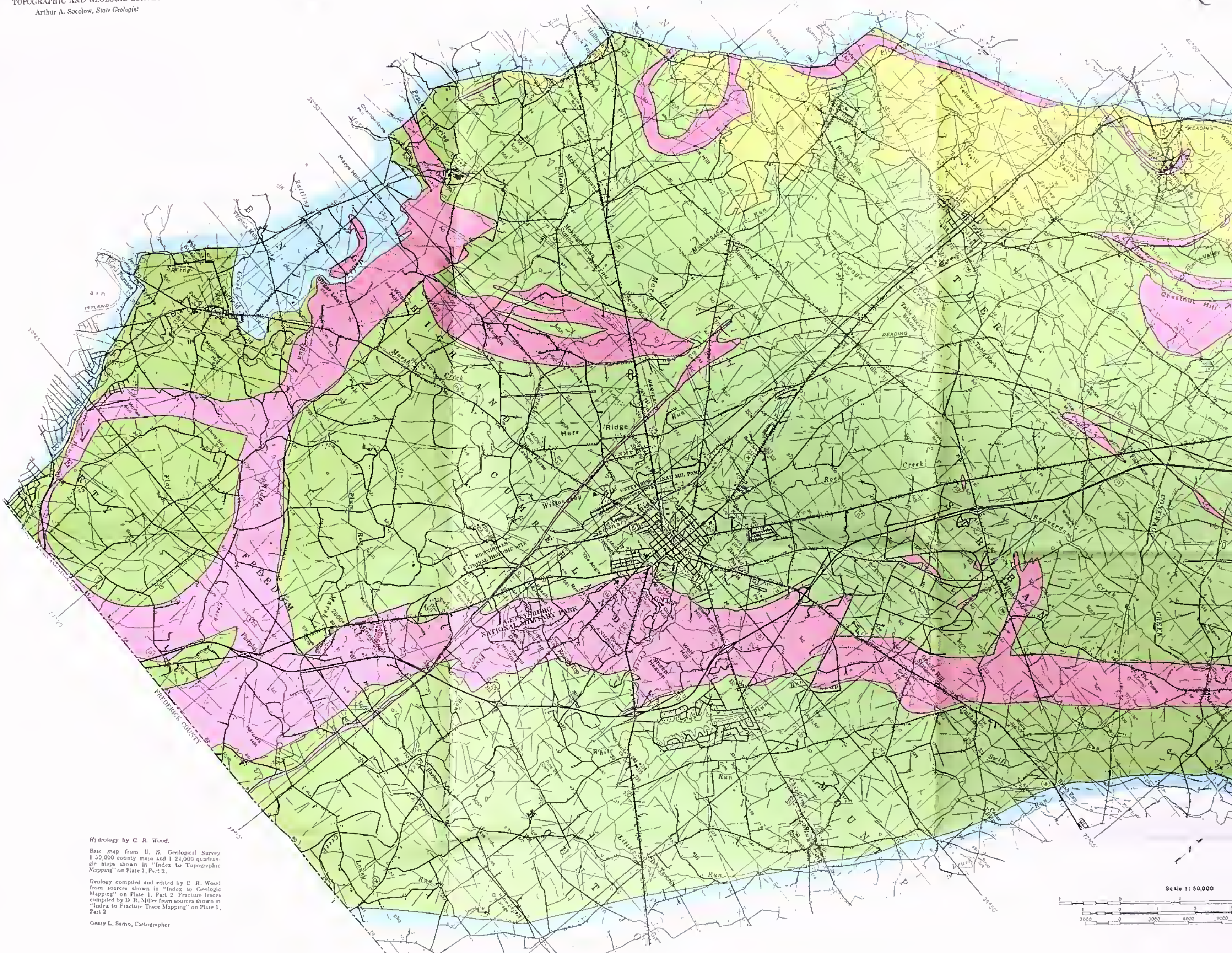
Table 17.

Well location: Number	Well location: Lat-Long	Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Yo- 966	4008-7651	Cleon Haring	Harrisburg's Kohl Bros.	1973	H	440	S	Trg/sh
967	4008-7651	Richard Weisar	do.	1970	H	440	S	Trg/ss
968	4001-7650	F. X. McGeechan	James P. Kohler	1973	H	520	S	Trg/sh
970	4005-7646	J. M. Bartos	Young Bros.	1973	H	420	H	Trg/ss
971	4001-7650	Wilson	do.	1973	H	540	H	Trg/ss
972	4008-7649	D. L. Renninger	John Thran	1974	H	635	S	Trg/ss
973	4001-7650	David Loy	Eichelberger Well Drilling	1975	H	520	V	Trg/sh
974	4002-7650	Carl Yingling	Young Bros.	1972	H	600	S	Trg/ss
975	4002-7650	Kenneth Hoover	do.	1973	H	580	S	Trg/sh
977	4003-7703	Laderia, Inc.	Eichelberger Well Drilling	1974	U	585	S	Trg/sh
978	4005-7703	John Levine	Harrisburg's Kohl Bros.	1970	H	710	S	Trg/ss
979	4007-7702	L. L. Hair	Eichelberger Well Drilling	1975	H	520	S	Trd/db
980	4004-7703	Ronald Marks	do.	1971	H	660	S	Trd/db
981	4004-7703	A. C. Tesch	Harrisburg's Kohl Bros.	1972	H	640	S	Trg/ss
982	4005-7652	S. A. Hill	York Drilling Co., Inc.	1966	H	620	H	Trg/ss
983	4005-7654	Weil McGahen	John Thran	1974	H	720	S	Trg/ss
984	4005-7653	R. D. Marsh	Leon K. Sunday	1975	H	690	S	Trd/db
985	4003-7657	Steven Keller	A. C. Reider & Son, Inc.	1972	H	580	S	Trg/ss
986	4004-7654	Arthur Toomey	York Drilling Co., Inc.	1976	H	480	V	Trd/db
987	4005-7654	D. R. Kellison	do.	1966	H	600	S	Trd/db
988	4006-7654	Gordon Myers	John Thran	1974	H	680	S	Trd/db
989	4005-7658	William Clayton	York Drilling Co., Inc.	1966	H	705	V	Trd/db
990	4005-7657	C. M. Reed	do.	1967	H	660	S	Trd/db
991	4003-7654	H. L. Kochenderfer	do.	1966	H	515	V	Trd/db
992	4004-7655	Gerald Danner	do.	1974	H	625	H	Trd/db
993	4004-7655	Robert Kellison	do.	1974	U	550	S	Trd/db
994	4003-7657	Donald Wilson	John Thran	1974	H	565	S	Trg/ss
995	4005-7655	Forest Cutlip	York Drilling Co., Inc.	1966	H	560	H	Trd/db
996	4005-7655	William Clapp	do.	1967	H	500	V	Trd/db
997	4003-7655	Lavern Rumsey	A. C. Reider & Son, Inc.	1972	H	565	S	Trd/db
998	4004-7657	Harold Forscht	Young Bros.	1968	H	695	S	Trg/sh
999	4003-7657	John Powley	do.	1968	H	710	H	Trg/sh
1000	4004-7657	P. L. Albert	York Drilling Co., Inc.	1966	H	660	S	Trg/sh
1001	4004-7657	Carlos Hundely	do.	1966	H	680	S	Trg/sh
1002	4004-7659	Larry Emig	do.	1966	H	560	V	Trd/db
1003	4003-7657	Jay Powley	Young Bros.	1968	H	705	H	Trg/sh
1004	4004-7657	George Robson	York Drilling Co., Inc.	1966	H	500	S	Trd/db
1005	4002-7658	Lewis Altland	Young Bros.	1966	H	570	S	Trg/sh
1006	4001-7656	H. D. Repman	York Drilling Co., Inc.	1967	H	515	S	Trd/db
1007	4000-7658	B. R. Myers	Young Bros.	1968	H	490	S	Trd/db
1008	4000-7657	H. L. Claybaugh	York Drilling Co., Inc.	1967	H	480	H	Trg/sh
1009	4000-7658	William Vassiler	Young Bros.	1969	U	510	S	Trd/db
1010	4001-7656	Ronald Storms	do.	1967	H	520	H	Trd/db
1011	4001-7656	R. O. Border	York Drilling Co., Inc.	1966	H	560	H	Trd/db
1012	4001-7656	T. S. Capello	do.	1966	H	565	H	Trd/db
1013	4002-7657	Rudy Stegmann	Young Bros.	1969	H	545	S	Trg/sh
1014	4002-7656	Ronald Byers	York Drilling Co., Inc.	1966	H	495	S	Trg/sh
1015	4002-7654	W. L. Cassell, Jr.	do.	1966	H	465	H	Trd/db
1016	4003-7654	O. G. Weaver	Young Bros.	1970	H	505	V	Trd/db
1017	4003-7653	R. O. Nell	do.	1970	H	375	V	Trg/sh
1018	4004-7652	Junior Seifert	do.	1969	H	500	S	Trg/sh
1019	4003-7653	C. A. Lefever	do.	1970	H	420	S	Trg/sh
1020	4002-7653	L. C. Miller	do.	1971	H	535	H	Trg/ss
1021	4002-7652	C. L. Harlacher	do.	1974	H	520	H	Trg/ss
1022	4000-7653	R. F. Sword	James P. Kohler	1973	H	585	S	Trg/sh
1023	4000-7654	John Keefer	Young Bros.	1971	H	560	S	Trg/ss
1024	4000-7655	James Kauffman	do.	1974	H	420	H	Trg/sh
1025	4000-7656	Gerald Meckley	do.	1973	H	380	S	Trg/sh
1026	4010-7650	Fishing Creek Sch.	Harrisburg's Kohl Bros.	1954	T	510	V	Trg/ss
1028	3959-7656	Glenn Julius	Young Bros.	1973	H	375	V	Trg/sh
1029	3958-7656	Donald Julius	do.	1974	H	380	V	Trg/sh
1030	3958-7656	John Davenport	do.	1974	H	380	V	Trg/sh
1031	3959-7657	Edward Lighty	Weldo W. Funt	1968	H	500	H	Trg/ss
1032	3959-7658	Ernest Hofman	York Drilling Co., Inc.	1966	H	445	S	Trg/sh
1033	3959-7658	Ronald Teal	Young Bros.	1968	H	405	V	Trg/sh
1034	3958-7658	John Wida	do.	1969	H	430	S	Trg/sh
1035	3959-7657	Larry Oakes	do.	1972	H	520	H	Trg/ss
1036	3958-7657	John Dellinger	do.	1969	H	495	H	Trg/ss
1037	3958-7657	do.	do.	1969	U	500	H	Trg/ss
1038	3959-7655	R. B. Stauffer	do.	1968	H	560	H	Trg/ss
1039	3959-7657	L. W. Leighty	do.	1970	H	505	H	Trg/ss
1042	4000-7654	Michael Saltzgiver	do.	1975	H	443	S	Trg/sh
1043	4002-7704	Carlyle Gray	---	---	H	520	S	Trg/ss
1049	4008-7655	Robert Miller	Germania Drilling Co.	1962	U	760	V	Trg/---

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gpm)	Specific capacity (gpm/ft)	Hard-ness (gpg)	Specific conduc-tance (micro-mhos at 25°C)	pH	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
120	30	6	50;70;105	50	9/73	8	.11	---	---	---	Yo- 966
98	40	6	60;85	17	7/70	12	.15	---	---	---	967
190	53	6	85;165	34	7/76	15	---	7	255	---	968
205	38	6	151;179;194	---	---	10	---	---	---	---	970
327	43	6	138;325	---	---	50	---	---	---	---	971
300	50	6	---	---	---	5	---	2	110	---	972
175	43	6	168	---	---	10	---	---	---	---	973
167	25	6	80;140	---	---	5	---	---	---	---	974
157	48	6	60;110;148	---	---	9	---	---	---	---	975
400	34	6	97;181	30	7/76	30	---	---	---	---	977
298	41	6	295	115	7/70	1	.01	---	---	---	978
96	94	6	95	32	7/76	25	---	9	360	---	979
123	70	6	118	40	2/71	8	.11	7	290	---	980
380	33	6	200	50	10/72	2	.01	7	265	---	981
100	16	6	81	---	---	12	---	12	460	---	982
400	42	6	150	60	8/76	3	---	7	260	---	983
95	48	6	73;90	18	8/76	8	---	4	175	---	984
110	15	6	40	18	8/76	3	.03	10	350	6.9	985
45	23	6	26	---	---	8	---	8	300	---	986
82	14	6	80	---	---	15	---	5	220	---	987
500	25	6	---	---	---	1	---	4	185	---	988
185	16	6	30;150	---	---	2	---	3	100	---	989
79	27	6	68	---	---	2	---	5	180	---	990
38	10	6	37	---	---	25	---	9	330	---	991
200	75	6	90;155	20	9/76	2	---	7	260	---	992
150	20	6	---	10	9/74	0	---	---	---	---	993
200	38	6	153;180	---	---	30	---	11	410	---	994
105	22	6	33	---	---	1	---	9	345	---	995
75	27	6	35	---	---	5	---	---	---	---	996
170	26	6	35	27	8/76	2	.01	---	---	---	997
105	22	6	48;78;103	20	8/68	25	---	---	---	---	998
120	29	6	37;72;115	---	---	2	---	---	---	---	999
100	18	6	83	---	---	15	---	10	380	---	1000
150	17	6	147	---	---	2	---	---	---	---	1001
85	22	6	24;45;55	---	---	10	---	4	165	---	1002
180	33	6	70	25	7/68	1	---	6	250	---	1003
65	30	6	37;50	---	---	12	---	5	180	---	1004
100	22	6	42;95	33	7/66	8	---	10	395	---	1005
41	15	6	25	---	---	2	---	---	---	---	1006
147	20	6	30	30	5/68	2	---	15	600	---	1007
165	15	6	145	---	---	15	---	---	340	---	1008
207	28	6	40	19	8/76	2	---	11	470	---	1009
310	20	6	30	16	8/67	1	---	6	240	---	1010
82	21	6	40;75	---	---	8	---	---	---	---	1011
150	14	6	127	40	11/66	5	---	---	---	---	1012
158	29	6	90;142	14	8/76	8	---	11	420	---	1013
320	19	6	35	---	---	2	---	---	---	---	1014
140	8	6	92	---	---	1	---	8	300	6.2	1015
137	20	6	100;122	8	11/70	1	---	10	340	---	1016
137	20	6	58;113;124	30	11/70	8	---	10	400	---	1017
204	20	6	72;144;198	---	---	8	---	9	380	---	1018
146	20	6	132	---	---	4	---	10	395	---	1019
250	23	6	135;237;242	79	6/71	6	---	---	---	---	1020
207	25	6	94	---	---	3	---	6	225	---	1021
130	26	6	---	60	5/73	6	---	---	---	---	1022
207	29	6	102;178	62	2/71	4	---	6	225	6.3	1023
226	20	6	40;112;218	---	---	20	---	10	360	---	1024
84	26	6	---	---	---	11	---	13	430	---	1025
165	44	6	48;70;85;115; 150	20	1/54	50	2.9	---	---	---	1026
126	30	6	55;115	---	---	6	---	---	---	---	1028
162	20	6	78;140;151	---	---	15	---	---	---	---	1029
127	20	6	55;72;115	---	---	9	---	9	385	---	1030
128	20	6	118	30	5/68	20	.32	---	---	---	1031
200	29	6	165	53	8/76	8	---	12	480	---	1032
167	20	6	62;118;155	37	10/68	4	---	---	---	---	1033
178	27	6	72;168	---	---	12	---	---	---	---	1034
137	24	6	95;125	---	---	8	---	10	360	---	1035
395	23	6	63	24	4/69	2	---	12	420	---	1036
332	27	6	80	52	8/76	2	---	---	---	---	1037
323	30	6	42;88	71	6/68	2	---	5	215	---	1038
167	20	6	63;145	35	9/70	3	---	9	290	---	1039
187	20	6	118;155	40	8/76	4	---	10	360	---	1042
53	---	6	---	18	9/58	2	.06	---	---	---	1043
3509	2990	4	---	26	6/78	---	---	---	---	---	1049

TOPOGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, *State Geologist*



Hydrology by C. R. Wood.

Base map from U. S. Geological Survey 1 50,000 county maps and 1 24,000 quadrangle maps shown in "Index to Topographic Mapping" on Plate 1, Part 2.

Geology compiled and edited by C. R. Wood from sources shown in "Index to Geologic Mapping" on Plate 1, Part 2. Fracture traces compiled by D. R. Miller from sources shown in "Index to Fracture Trace Mapping" on Plate 1, Part 2

Geary L. Samo, Cartographer

PLATE 1, PART 1. GEOLOGIC MAP OF THE GETTYSI
IN SOUTHEASTERN PENNSYLVANIA, SHOWING THE LOC

BY CHARLES R. W

1980

(See Plate 1, Part 2 for explanation of map u

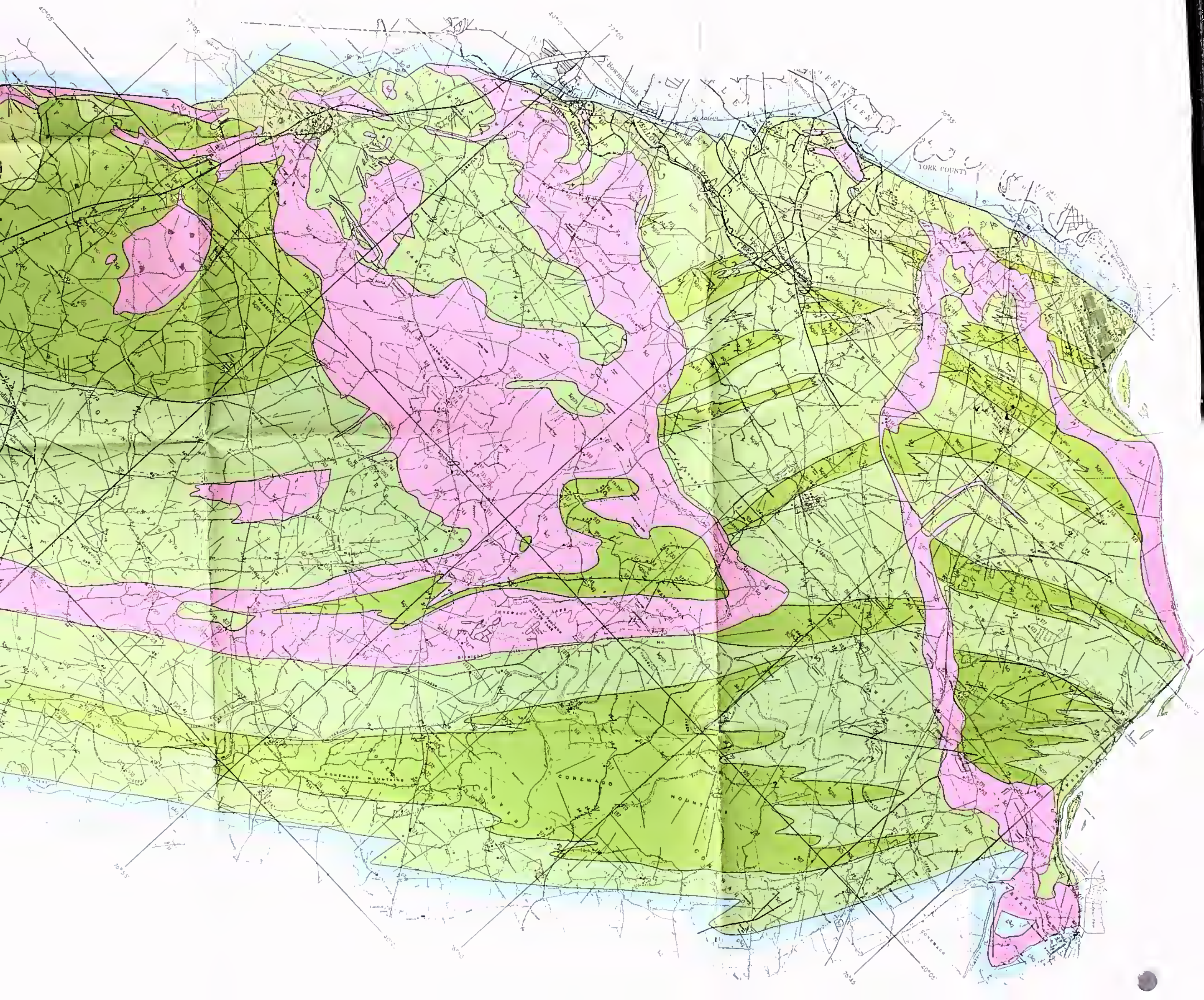
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

PLATE 1, PART 1. GEOLOGIC MAP OF THE GETTYSBURG AND HAMMER CREEK FORMATIONS IN SOUTHEASTERN PENNSYLVANIA, SHOWING THE LOCATIONS OF WELLS AND FRACTURE TRACES

BY CHARLES R. WOOD

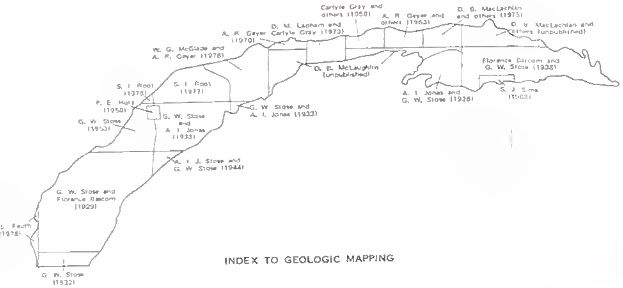
1980

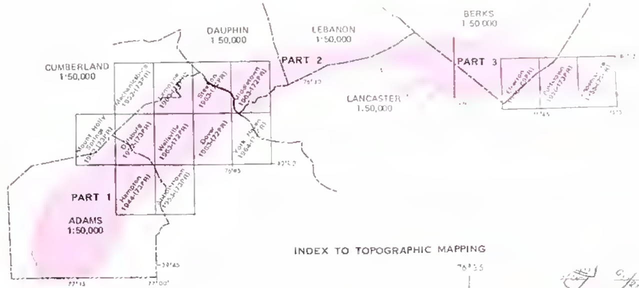
(See Plate 1, Part 2 for explanation of map units and symbols)


YORK COUNTY
CONEWAGO MOUNTAINS
CONEWAGO
MOUNTAINS

OGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, *State Geologist*

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCE





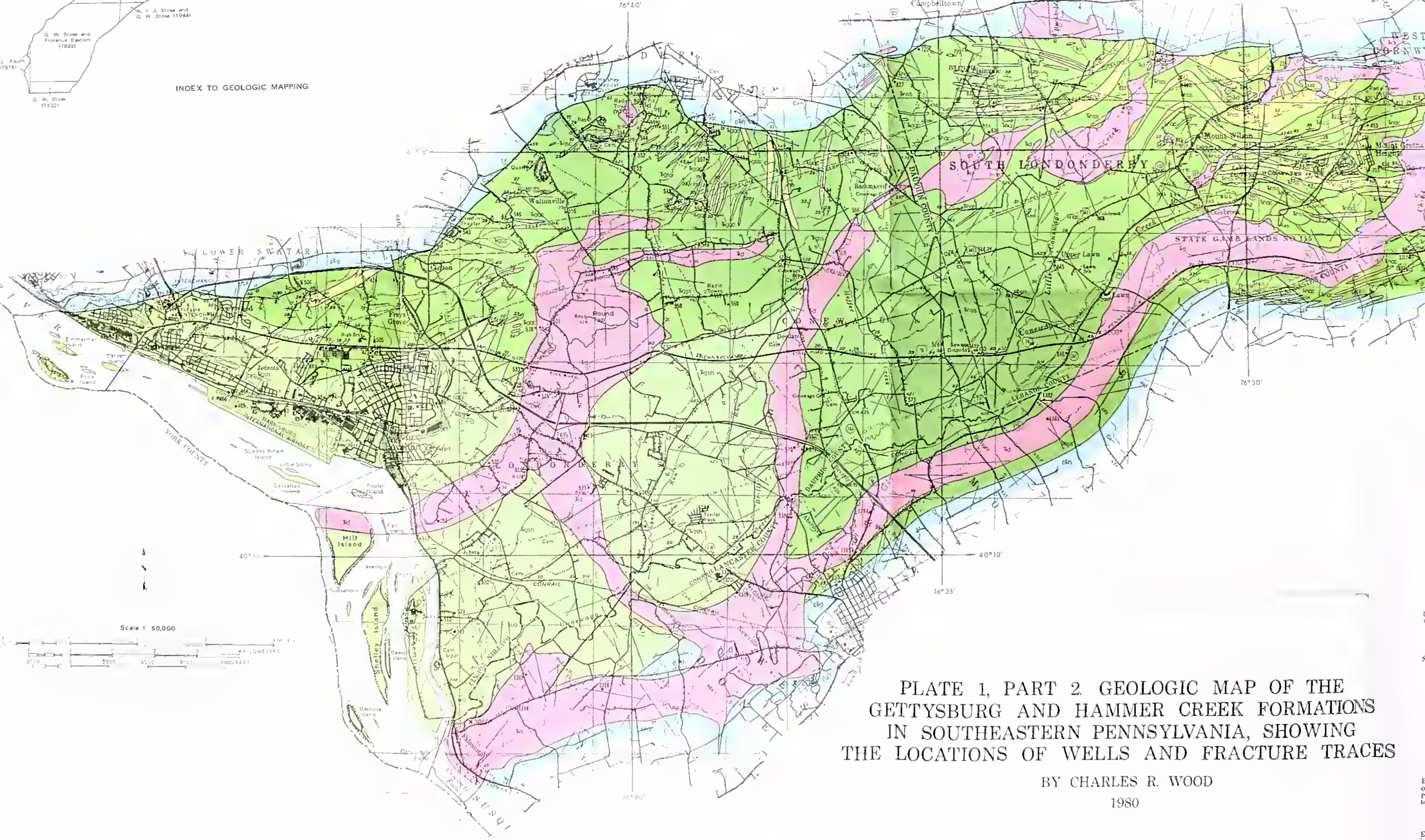
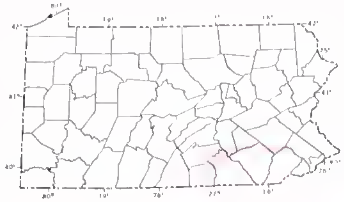


PLATE 1, PART 2. GEOLOGIC MAP OF THE GETTYSBURG AND HAMMER CREEK FORMATIONS IN SOUTHEASTERN PENNSYLVANIA, SHOWING THE LOCATIONS OF WELLS AND FRACTURE TRACES

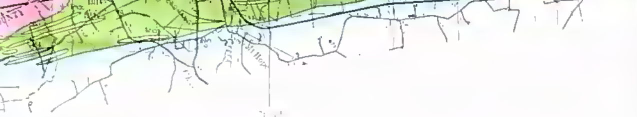
BY CHARLES R. WOOD

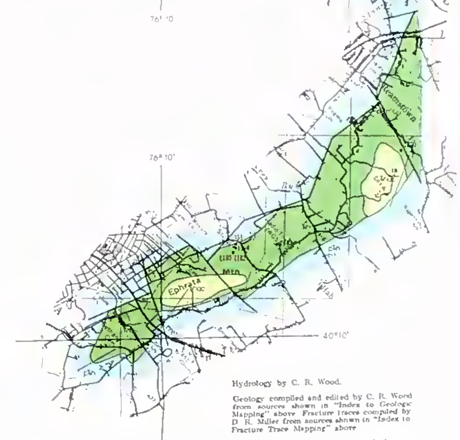
1980

DEX TO FRACTURE TRACE MAPPING



LOCATION OF AREA





EXPLANATION

No age correlations are implied by the order used in this stratigraphic column. However, the diabase is younger than most of the sedimentary rocks, and at least part of the Gettysburg and Hammer Creek Formations are of the same age. The map shows the dominant lithologies. Not all areas have been mapped in equal detail. All of the sedimentary lithologies mapped are interbedded with one or more of the other lithologies. Data on yield and specific capacity are from nondomestic wells.

	GEOLOGIC DESCRIPTION	UNIT		HYDROLOGIC CHARACTERISTICS
TRIASSIC	Medium- to coarse-grained, dark gray diabase formed chiefly of plagioclase feldspar and black to green augite. One of two small lava flows is included in this map unit. Dikes are shown as thin red lines. Weathers to large spheroidal boulders. Recent research suggests that portions of this unit may be Early Jurassic in age.	DIABASE TRd	TRd	A very poor aquifer. Water is hard and especially subject to contamination by septic-tank effluent. Median well yield is only 6 gpm and median specific capacity is about 0.1 gpm/ft. Very little water is encountered below 150 feet.
	Fanglomerate composed of poorly sorted pebbles to boulders of white vein quartz and red siltstone in a red silty sandstone matrix. In Adams County clasts consist of rounded cobbles and boulders of quartzite, sandstone, quartz, and some aporhyolite.	GETTYSBURG (TRg) AND HAMMER CREEK (TRh) FORMATIONS	QUARTZ CONGLOMERATE TRgqc TRhqc	Water is soft and low in dissolved solids. Median pH is 5.9 and water tends to dissolve copper pipes. TRgqc — Median well yield is 21 gpm and median specific capacity is 0.22 gpm/ft. Very few wells yield more than 50 gpm. Very little water is encountered below about 200 feet. TRhqc — Median well yield is 120 gpm and median specific capacity is 0.9 gpm/ft. Very little water is encountered below 300 feet.
	Fanglomerate composed of pebbles to boulders of fine-grained bluish limestone to finely crystalline marble in a matrix of red or gray calcareous sandstone or shale.		LIMESTONE CONGLOMERATE TRglc TRhlc	Water is hard. TRglc — Median well yield is 85 gpm and median specific capacity is 5.8 gpm/ft. Well yields range widely—median yield is 225 gpm in Adams County but only 25 gpm in York and Cumberland Counties. TRhlc — Too few data are available to evaluate this lithology. Probably a good aquifer.
	Fine- to coarse-grained, red, brown, and gray sandstone containing pebbles and some cobbles of well-rounded pink to light-gray vein quartz and quartzites, and some clasts of red and brown siltstone and sandstone. Heidlersburg Member (west of Susquehanna River not shown on map)—Thick to massive beds of well-sorted, medium- to coarse-grained, red feldspathic sandstone, weathers light gray.		SANDSTONE TRgss TRhss	Water is of good quality, but is moderately hard. TRgss — Median well yield is 50 gpm and median specific capacity is 0.47 gpm/ft. TRhss — Median well yield is 90 gpm and median specific capacity is 0.98 gpm/ft.
	Red and maroon, micaceous and silty mudstones and shales, locally calcareous, and some thin red siltstone to very fine grained sandstone interbeds.		SHALE TRgsh TRhsh	Water is hard to very hard. A few wells, including several in the vicinity of Middletown, Pennsylvania, yield water high in sulfate. Zones yielding significant amounts of water are present to depths of at least 800 feet below land surface. TRgsh — Median yield of wells is 185 gpm in the vicinity of Middletown and 71 gpm for all other wells in this unit. Median specific capacity is 2.4 gpm/ft for wells in the vicinity of Middletown and 1.0 gpm/ft for all other wells in this unit. Low yields are common from wells drilled in the basal portion of the Gettysburg Formation. TRhsh — Median well yield is 144 gpm and median specific capacity is 2.0 gpm/ft.
	Chips of gray shale in a red sandstone matrix.		SHALE CONGLOMERATE TRgsc	Too few data are available to evaluate the hydrologic properties of this unit.
TRIASSIC AND OLDER	Not studied.	PRE-GETTYSBURG FORMATION (TRg) PRE-HAMMER CREEK FORMATION (TRh)		Not studied.

SYMBOLS

Contact
Includes approximately located and inferred contacts.

Fault
Includes approximately located and inferred faults. U, upthrown side; D, downthrown side.

Strike and dip of bedding or attitude of diabase sheet

Fracture trace
Obtained from aerial photographs; not field checked

Water well and well number

Borehole

Well

Borehole or well showing interval(s) (in feet) in diabase or overburden derived from diabase
Plus sign indicates borehole or well was still in diabase when total depth was reached.

Estimated depth (in feet) to base of diabase sheet from land surface

HE
ATIONS
ING
TRACES

Hydrology by C. R. Wood.

Geology compiled and edited by C. R. Wood from sources shown in "Index to Geologic Mapping" above. Fracture traces compiled by D. R. Miller from sources shown in "Index to Fracture Trace Mapping" above.

Base map from U. S. Geological Survey 1:50,000 county maps and 1:24,000 quadrangle maps shown in "Index to Topographic Mapping" above.

Gary L. Sarno, Cartographer

TOPOGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, State Geologist

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

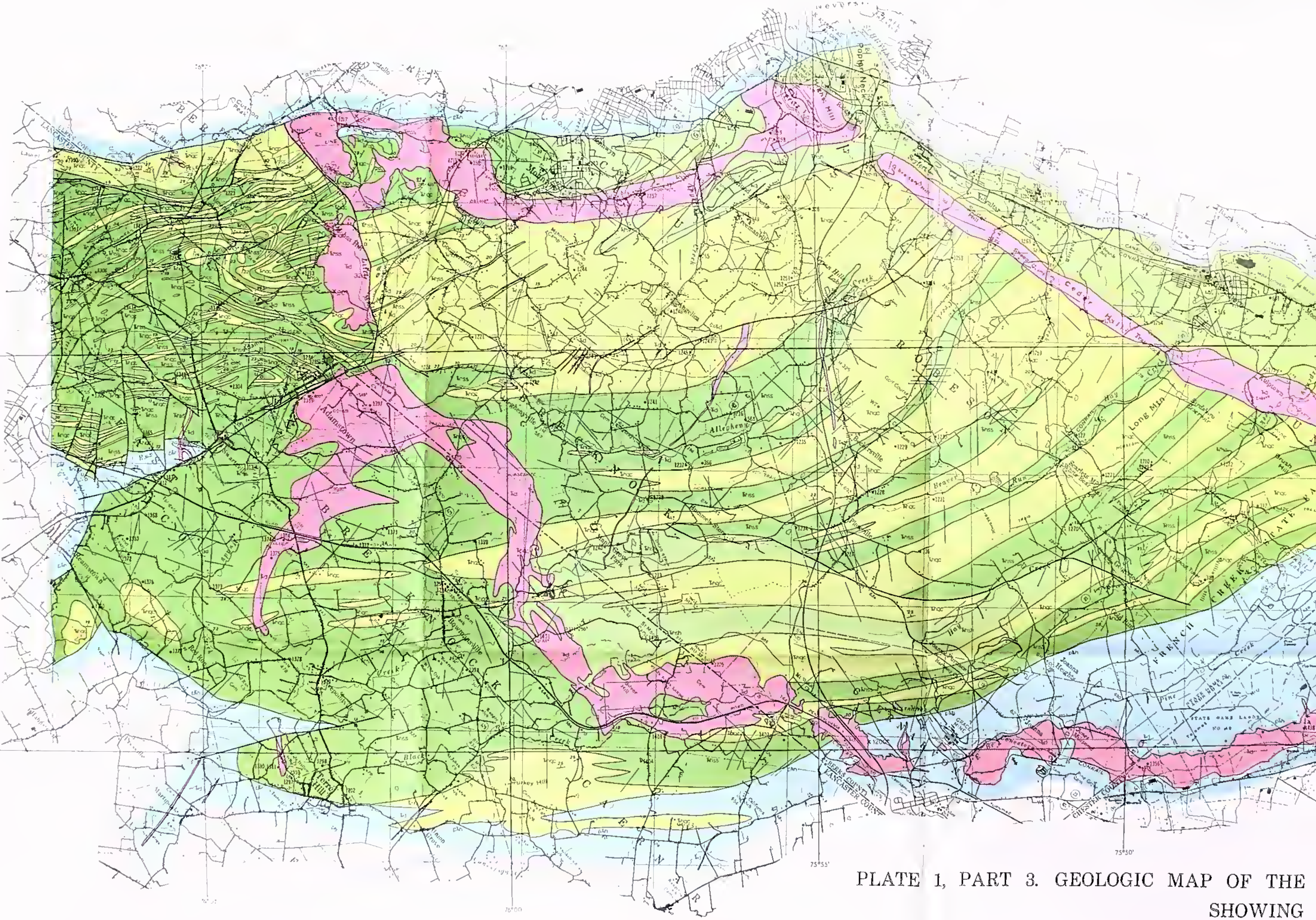


PLATE 1, PART 3. GEOLOGIC MAP OF THE
SHOWING

Hydrology by C R. Wood.

Geology compiled and edited by C R Wood from sources shown in "Index to Geologic Mapping" on Plate 1, Part 2 Fracture traces compiled by D R Miller from sources shown in "Index to Fracture Trace Mapping" on Plate 1, Part 2

Base map from U S Geological Survey 1 50,000 county maps and 1 24,000 quadrangle maps shown in "Index to Topographic Mapping" on Plate 1, Part 2

Geary L. Sarno, Cartographer

MAP OF THE GETTYSBURG AND HAMMER CREEK FORMATIONS IN SOUTHEASTERN PENNSYLVANIA, SHOWING THE LOCATIONS OF WELLS AND FRACTURE TRACES

BY CHARLES R. WOOD

1980

(See Plate 1, Part 2 for explanation of map units and symbols.)